Boardmonitor/Controlunit 22 SY 405/23

Service
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For repair information of the tape deck see Service Manual SCA 4.4 (4822 725 23509)

4703

Service Manual

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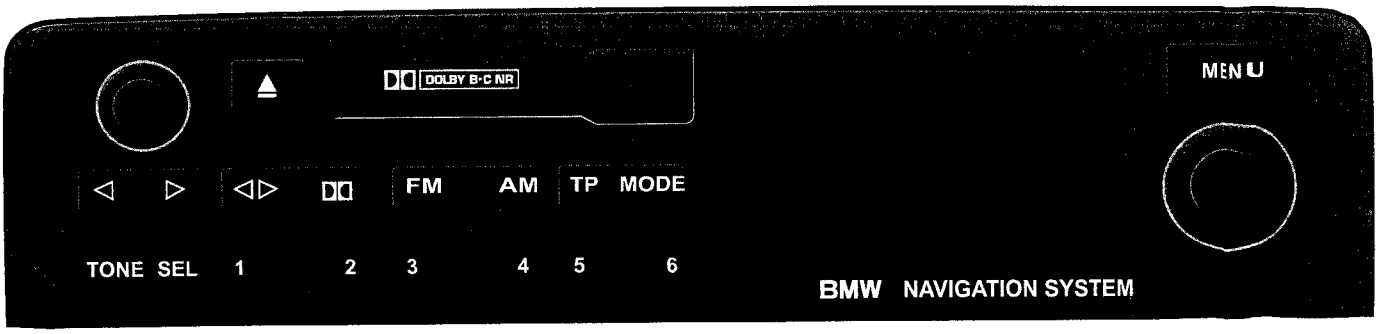
12 V



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PHILIPS

GENERAL

The control- and display-unit 22SY405 is part of the BMW system E46. It controls (via K-Bus) the carradio modul 22DC785 (C23 BM), the navigation computer (22SY561) and the CD Changer (optional). Furthermore the system settings can be controlled and the board computer data of the car can be interrogated and displayed.

To get the 22SY405 into operation a minimum of system environment is necessary:
- Power supply (KL30, KL-R, KL58G, KL31)
- A high K-BUS (connect BUS to 12 V via a 10 K pull up resistor)
- The C23 BM for radio / audio functions
- The nav. computer for the display functions (display is driven by the CSI board of 22SY561, signals are sent via NAVBUS)

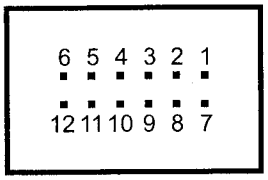
Because of the complex functionality the description of controls is omitted in this Service Manual.
It is recommended to refer to the BMW instructions for use which can be ordered at your local dealer or garage.

This Service Manual explains the electrical hardware and the mechanics of the modul only.
The BUS commands and communication structure can not be verified without special equipment (software and RS232/I-BUS interface).

TECHNICAL DATA

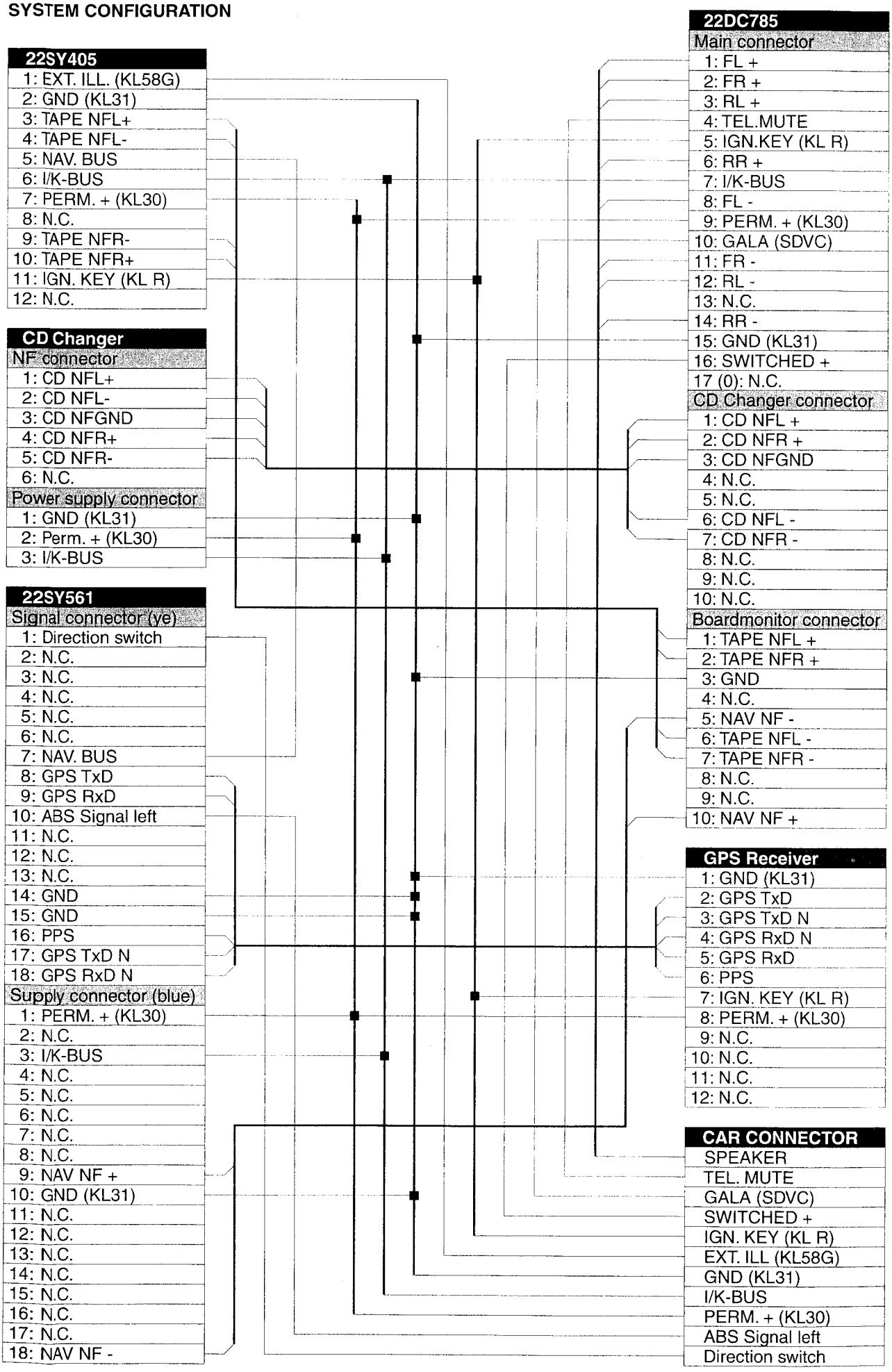
GENERAL	Power Supply	6 V–16 V for max. illumination acc. spec.13.5 V min. for tape deck functions acc. spec.10 V min. display illumination OFF at 17 V display illumination ON again at 16 V tape deck OFF at 10 V
	Quiescent current	0.1 mA
	Playback current	< 1.7 A (peak < 2 A Cass. insert) for max. illum., display heater on, Cass. FFW
	ON/OFF indication	ON: KL R > 6.5 V OFF: KL R < 2.7 V
SCA4.4 TAPE DECK	Number of tracks	2 x 2
	Tape speed	4.75 cm/s
	Winding time (C60)	< 100 s
	Wow & Flutter	< 0.3 %
	S/N ratio	> 48 dB DOLBY OFF, METAL > 65 dB DOLBY C, CHROME
	THD (at 1KHz)	< 1 %
AF PREAMPLIFIER	Output level	3 V_{eff}
	Channel separation	45 dB (1KHz)

CONNECTORBLOCK



1: EXT. ILL. (KL58G)
2: GND (KL31)
3: TAPE L+
4: TAPE L-
5: Nav. BUS
6: K-BUS
7: PERM. + (KL30)
8: N.C.
9: TAPE R-
10: TAPE R+
11: IGN. KEY (KL R)
12: N.C.

SYSTEM CONFIGURATION

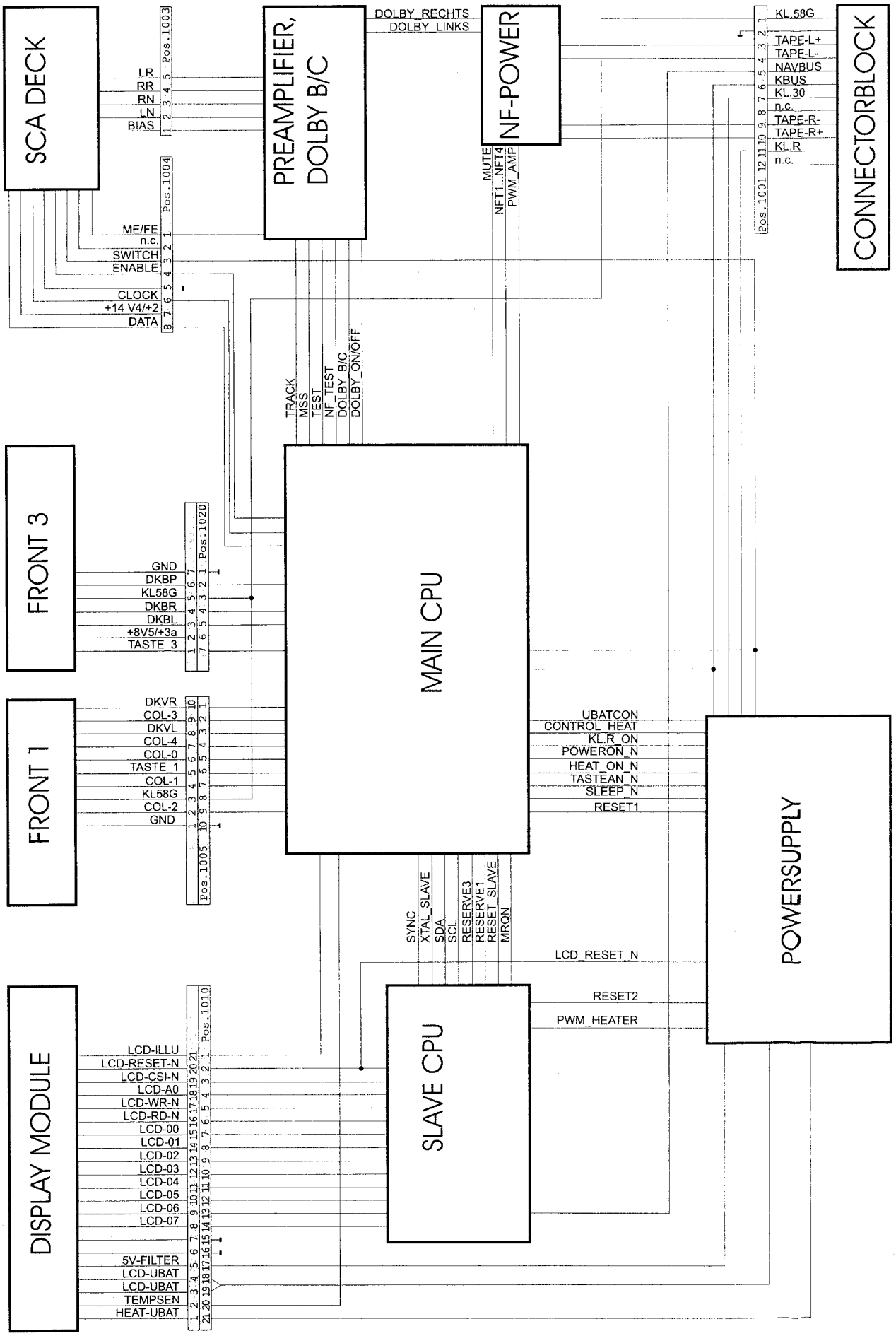


SIGNAL DESCRIPTION

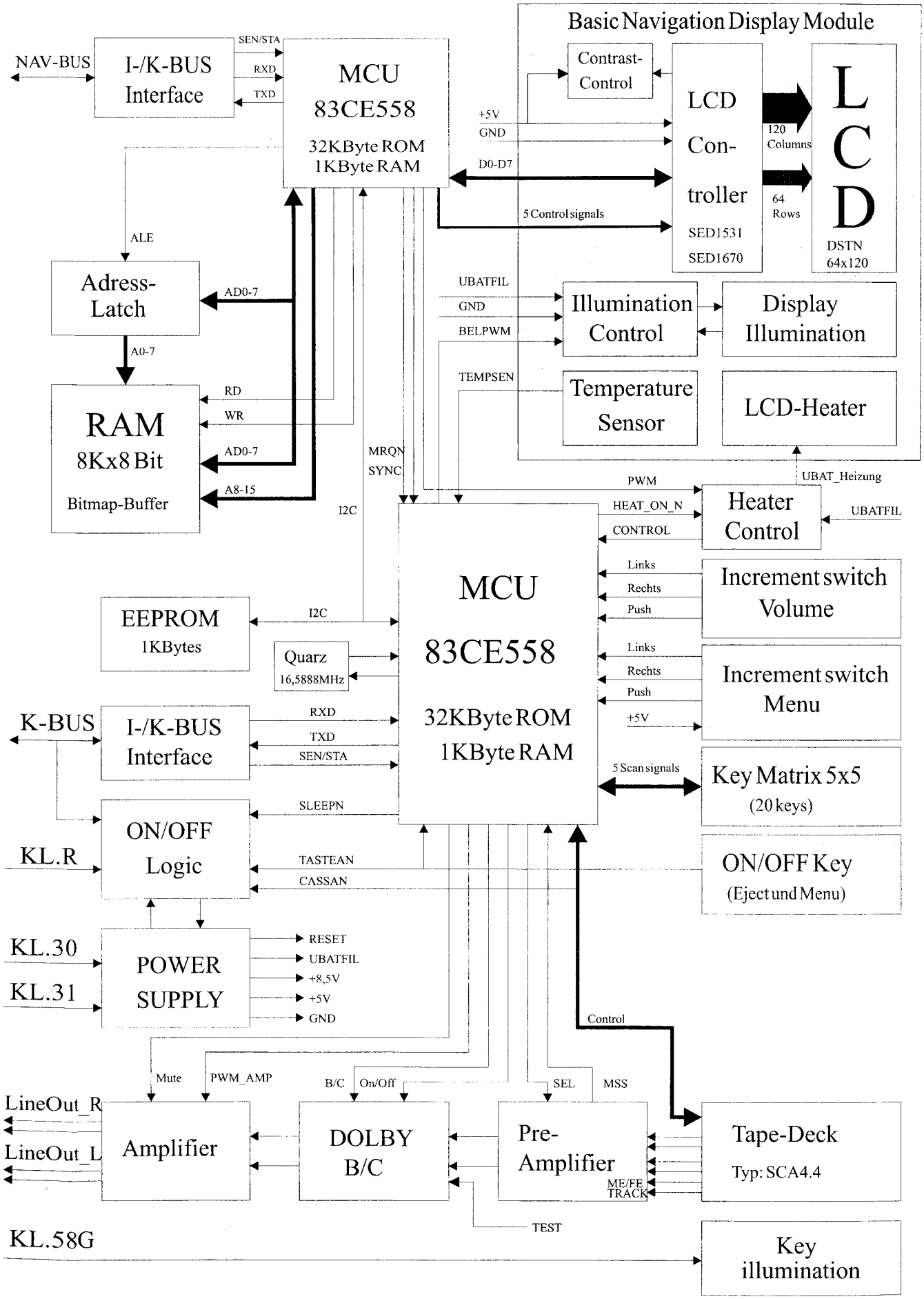
+14 V4/+1	**(M112)** Battery voltage filtered
+14 V4/+2	**(M103)** Battery voltage filtered, switched for AF Power, tape deck and 8.5V stabilizer IC
+14 V4/+2b	**(M107)** Battery voltage filtered, switched for NAV-BUS and I/K-BUS
+8V5/+3a	**(M102)** 8.5 V ±5%, max. 250 mA. Supply voltage for AF and optical increment switch.
+5V0/+7	**(M100)** 5.0 V ±2%, max. 200 mA. Supply voltage for logic IC's and display.
5V-FILTER	**(M804)** 5.0 V ±5%, max. 15 mA.Supply voltage for LCD controller interface.
BIAS	**(M505)** Common line of magnetic head (3.3 V DC)
CLOCK	**(M704)** 5.0 V. Tact signal for tape deck, pulses to GND during deck operation.
COL-0	**(M306)** 5.0 V. Keymatrix scan signal
COL-1	**(M307)** 5.0 V. Keymatrix scan signal
COL-2	**(M308)** 5.0 V. Keymatrix scan signal
COL-3	**(M309)** 5.0 V. Keymatrix scan signal
COL-4	**(M310)** 5.0 V. Keymatrix scan signal
CONTROL_HEAT	**(M901)** Heater ON/OFF control. Low = heater OFF, High = heater ON
DATA	**(M705)** 5.0 V. Data signal for tape deck, pulses to GND during deck operation
DKBL	**(M802)** Opt. incr. switch left. Alternating: High..... Low..... Low..... High..... High..... a.s.o
DKBR	**(M801)** Opt. incr. switch right. Alternating: High..... High..... Low..... Low..... High..... a.s.o.
DKBP	**(M800)** Opt. incr. switch push. Low = button pushed
DKVL	**(M312)** Mech. incr. switch left. Alternating: High..... Low..... High a.s.o.
DKVR	**(M313)** Mech. incr. switch right. Alternating: High..... Low..... High a.s.o.
DOLBY_B/C	**(Trans. Pos.7501, Base)** Low = DOLBY B, High = DOLBY C
DOLBY_LINKS	**(M400)** Dolby level left = 300mV$_{eff}$ (test tape 200nWb/m, 400Hz) to be aligned with poti 3544
DOLBY_ON/OFF	**(Trans. Pos.7500, Base)** Low = DOLBY ON, High = DOLBY OFF
DOLBY_RECHTS	**(M401)** Dolby level right = 300mV$_{eff}$ (test tape 200nWb/m, 400Hz) to be aligned with poti 3543
ENABLE	**(M706)** Direction control of tape deck interface. Low = µC->Deck, High = Deck->µC. 5 pulses to GND when RESET
HEAT_ON_N	**(M902)** Heater ON/OFF switch. Low = Heater ON, High = Heater OFF
HEAT-UBAT	**(M821)** Heater supply. Low (< 0.2 V) = Heater OFF, High (Battery voltage) = Heater ON
KBUS	**(M316)** Data BUS on battery voltage level
KL.30	**(M304)** Battery voltage, perm. +
KL.58G	**(M302)** Illumination supply, max. current 180 mA (at 13.5 V)
KL.R	**(M319)** Power supply from ignition key
KL.R_ON	**(M105)** Ignition ON / OFF control (high activ). 3.2 V when ignition ON
LCD_RESET_N	**(M110)** Reset signal for LCD controller (min. 1µs low activ). Low < 0.75 V, High > 4.25 V
LCD-00...07	**(M809...M816)** Control / Display signals for LCD
LCD-A0	**(M806)** Low -> LCD-00...07 are control data, High -> LCD-00...07 are display data
LCD-CSI-N	**(M805)** Chip select not signal (Low-activ)
LCD-ILLU	**(M818)** PWM signal (2050 Hz) for ill. control. Low (<0.8 V) = ill. ON, High (>2.4 V) = ill. OFF. 0-100% in 256 steps
LCD-RD-N	**(M808)** Read signal for LCD Controller (Low activ)
LCD-UBAT	**(M820)** Supply voltage for LCD (Battery voltage)
LCD-WR-N	**(M807)** Write signal for LCD Controller (Low activ)
LN	**(M501)** Left channel, NOR direction (3.3 V DC)
LR	**(M502)** Left channel, REV direction (3.3 V DC)
ME/FE	**(M507)** Low = FE, High = ME
MRQN	**(IC Pos.7203, Pin 43)** I²C BUS request line from slave controller (Low activ)
MSS	**(M508)** Low = NO modulation on tape, High = modulation on tape
MUTE	**(Trans. Pos.7402, Base)** Preamplifier mute signal. Low (0.0 V) = AF out, High (0.7 V) = AF mutet
NAVBUS	**(M315)** Display data BUS on battery voltage level
NF_TEST *	**(IC Pos.7503, Pins 1+28)** PWM reference signal for AF level test
NFT1...NFT4	**(IC Pos.7203, Pins 9...12)** AF level for amplifying control
POWERON_N	**(IC Pos.7203, Pin 37)** Control signal to switch supply voltages +8V5/+3a, HEAT-UBAT, +14V4/+2. Low = voltages ON
PWM_AMP	**(Trans. Pos.7403, Base)** PWM signal for continuously amplifying control
PWM_HEATER	**(M905)** PWM signal to enable the heater circuit. Interrupts HEAT_ON_N in case of a hardware malfunction.
RESERVE1+3	**(IC Pos.7203, Pin 19+21)** Reserved signal lines between main- and slave-controller (5.0 V level)
RESET_SLAVE	**(M601)** Logic reset signal from main CPU after power interruption. High activ.
RESET1	**(M101)** Power reset signal for main CPU (min. 10ms high activ). Low < 0.8 V, High > 3.85 V
RESET2	**(M101)** Power reset signal for slave CPU (min. 10ms high activ). Low < 0.8 V, High > 3.85 V
RN	**(M503)** Right channel, NOR direction (3.3 V DC)
RR	**(M504)** Right channel, REV direction (3.3 V DC)
SCL	**(IC Pos.7203, Pin 39)** Clock signal for I²C BUS (5.0 V level)
SDA	**(IC Pos.7203, Pin 40)** Data signal for I²C BUS (5.0 V level)
SLEEP_N	**(IC Pos.7203, Pin 38)** Switch OFF signal (Low activ 3 ms) if KL-R OFF or I/K BUS not activ for 60 s.
SWITCH	**(M703)** Cassette insert pulse. High (11.0 V) = Cassette insert and cassette standby
SYNC	**(IC Pos.7203, Pin 20)** Handshake signal for synchronisation of main- and slave-CPU. High activ when unit starts up.
TAPE-L-	**(M314)** 1.5 V$_{eff}$ at 235 Ω (measured with test tape 250 nW/m, 315 Hz)
TAPE-L+	**(M300)** 1.5 V$_{eff}$ at 235 Ω (measured with test tape 250 nW/m, 315 Hz)
TAPE-R-	**(M317)** 1.5 V$_{eff}$ at 235 Ω (measured with test tape 250 nW/m, 315 Hz)
TAPE-R+	**(M318)** 1.5 V$_{eff}$ at 235 Ω (measured with test tape 250 nW/m, 315 Hz)
TASTE_1	**(M311)** High (11.5 V) = Eject button released, Low = Eject button pushed
TASTE_3	**(M803)** High (11.5 V) = Menu button released, Low = Menu button pushed
TASTEAN_N	**(Trans. Pos.7103, Coll.)** Event switch ON signal. High = Menu or Eject released, Low = Menu or Eject pushed
TEMPSEN	**(M817)** Temperature related voltage from display for heater ON/OFF decision. $U_{25°C}$~3.8 V
TEST *	**(Trans. Pos.7502, Base)** High (0.7 V) = NF_TEST disabled, Low = NF_TEST enabled (Dolby IC switched to AUX)
TRACK	**(M506)** Low = REV. direction, High = NOR. direction
UBATCON	**(M108)** KL.R control voltage. Over-/undervoltage indication for switch OFF (~1.7V for KL.R=10V, ~2.9V for KL.R=17V)
XTAL_SLAVE	**(IC Pos.7602, Pin 52)** Tact frequency (16.5888 MHz) for main- and slave-CPU (DC ~ 1.4 V)

* only for production purposes

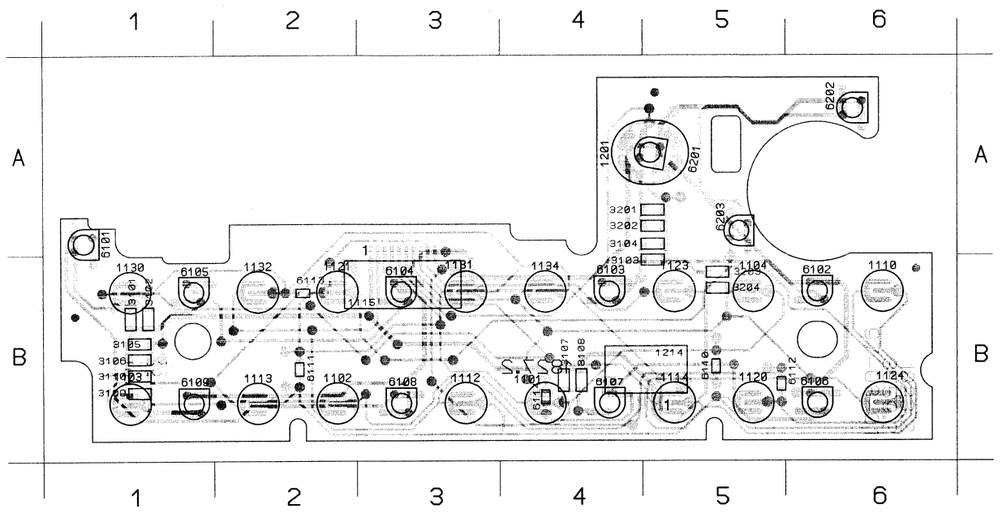
WIRING DIAGRAM



BLOCK DIAGRAM



FRONT PWB 1



1101 B 4	1123 B 5	3104 A 5	6101 A 1	6112 B 5
1102 B 2	1124 B 6	3105 B 1	6102 B 6	6113 B 2
1103 B 1	1130 B 1	3106 B 1	6103 B 4	6114 B 4
1104 B 5	1131 B 3	3107 B 4	6104 B 3	6201 A 5
1110 B 6	1132 B 2	3108 B 4	6105 B 1	6202 A 6
1112 B 3	1134 B 4	3109 B 1	6106 B 6	6203 A 5
1113 B 2	1201 A 5	3110 B 1	6107 B 4	
1114 B 5	1214 B 5	3201 A 5	6108 B 3	
1115 B 3	3101 B 1	3202 A 5	6109 B 1	
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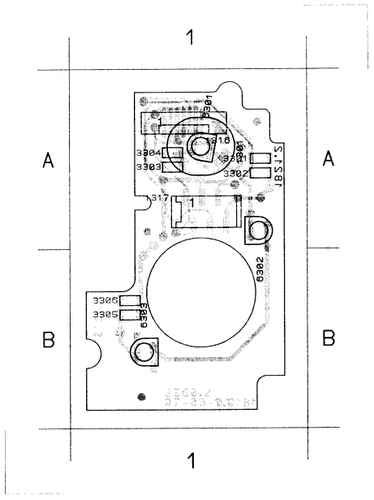
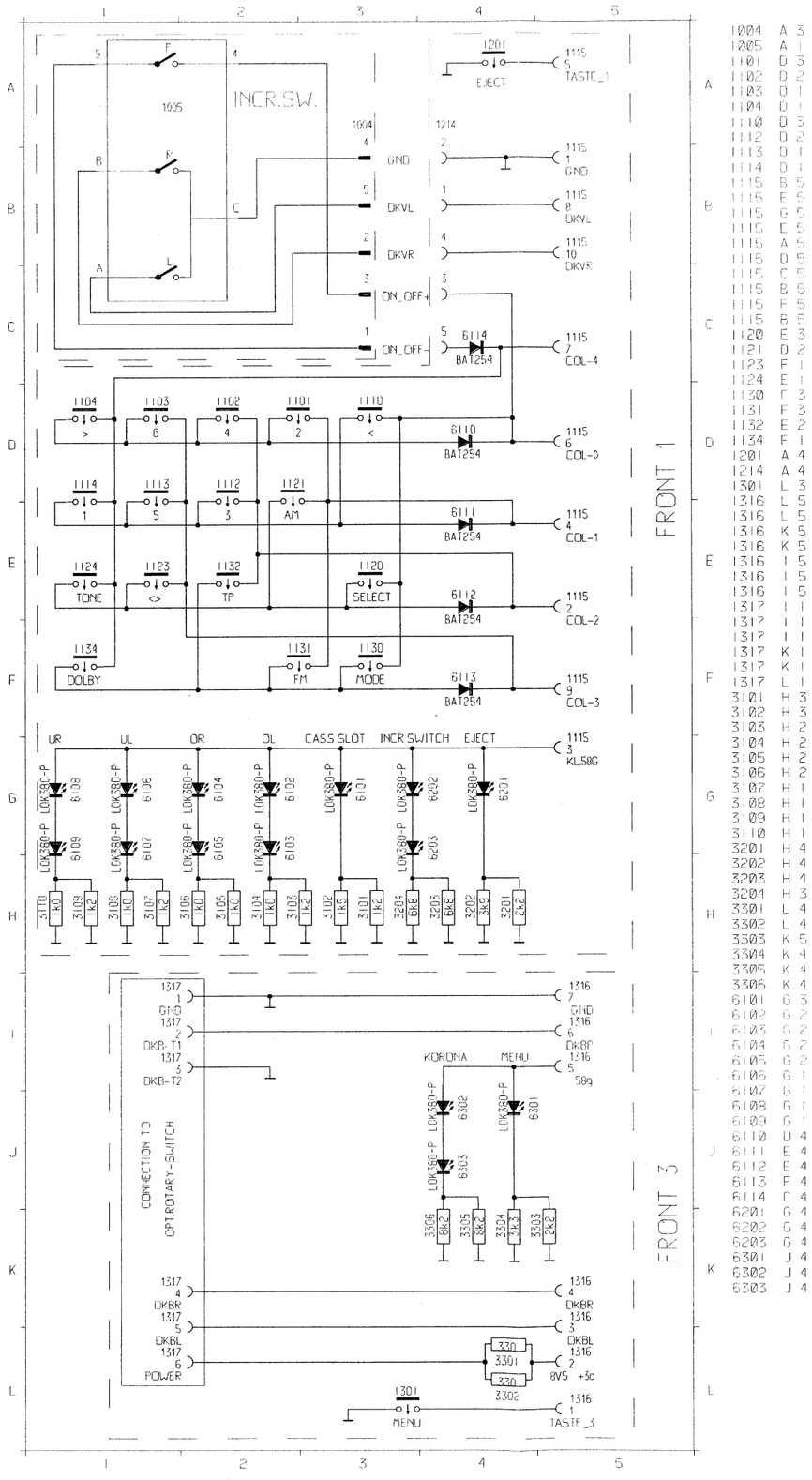
1121 B 2	3103 B 5	3204 B 5	6111 B 2	

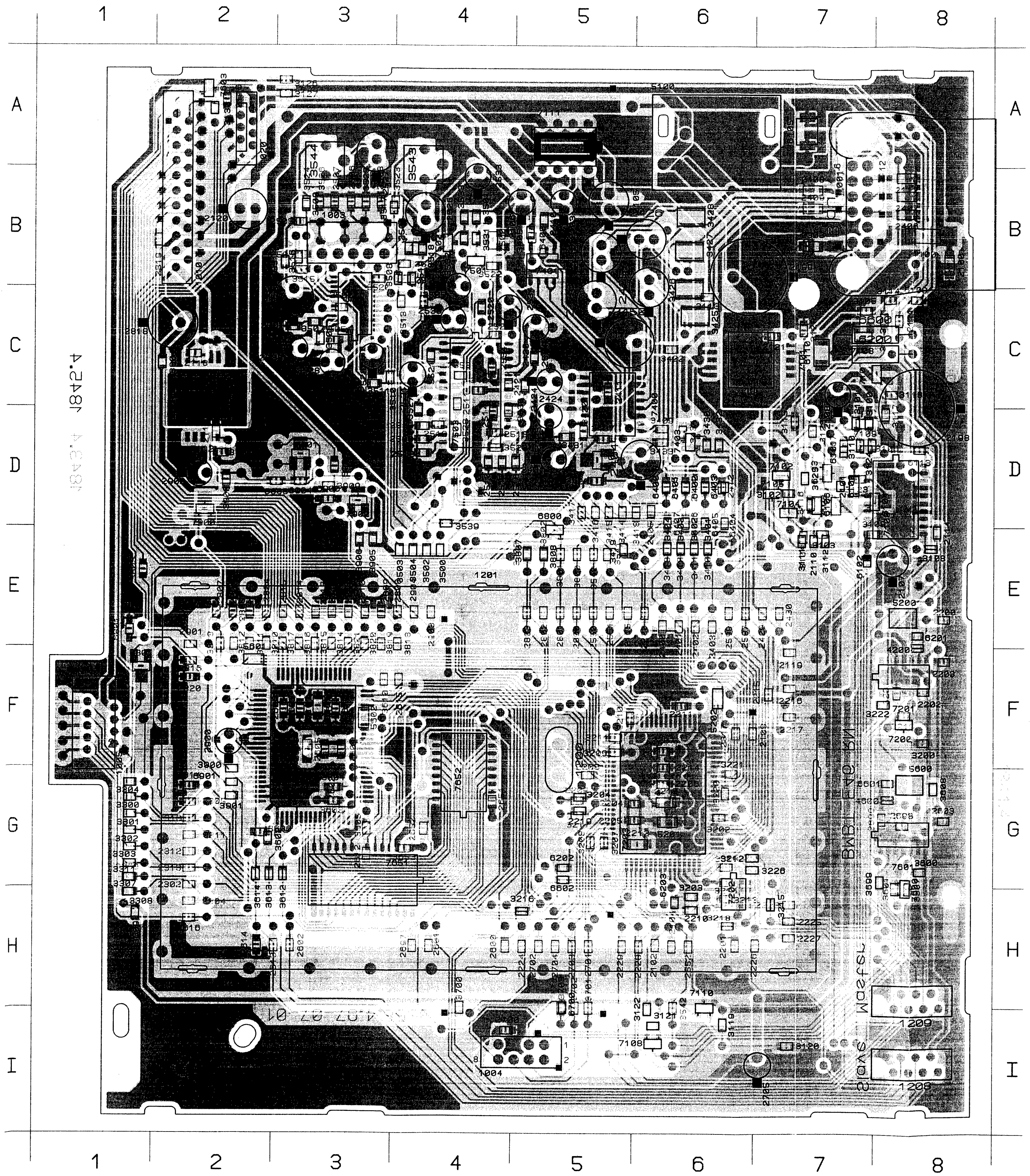
FRONT PWB 3



1301 A 1	
1316 A 1	
1317 A 1	
3301 A 1	
3302 A 1	
3303 A 1	
3304 A 1	
3305 B 1	
3306 B 1	
6301 A 1	
6302 A 1	
6303 B 1	



MAIN-PWB A-SIDE VIEW



1001 B 7
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1005 F 1
1010 B 2
1020 A 2
1200 F 5
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1209 H 8
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2103 B 5
2105 B 5
2106 B 5
2107 E 8
2108 C 7
2110 E 7
2114 E 8
2120 B 2
2198 C 8
2199 B 6
2210 H 6
2219 G 5

2404 D 6
2410 B 5
2420 C 5
2423 D 5
2424 C 5
2425 B 6
2426 B 6
2427 B 5
2428 C 5
2431 D 5
2450 C 5
2501 C 3
2504 B 4
2509 D 4
2510 D 4
2515 D 4
2516 D 5
2517 D 4
2518 D 4
2520 C 4
2524 C 5
2525 B 4
2526 B 4
2527 A 3
2528 C 3
2529 C 3
2530 C 4
2531 C 4
2532 C 3
2533 B 4
2534 C 4
2535 C 3

2612 G 3
2705 I 7
2818 C 2
2900 F 2
2902 D 2
3100 D 7
3101 D 7
3102 D 7

3108 E 8
3110 D 7
3111 E 7
3112 E 7
3119 I 6
3121 I 6
3122 I 6
3124 D 7
3125 D 7
3130 A 2
3203 H 6
3204 G 5
3212 G 6
3215 H 7
3216 H 5
3222 F 8
3226 G 6
3300 G 1
3301 G 1
3302 G 1
3303 G 1
3304 G 1
3307 G 1
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3402 E 6
3403 E 6
3404 E 6
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3418 D 6
3419 E 5
3420 D 5
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3426 C 6
3427 B 6
3428 B 6
3429 D 5
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3432 D 6
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3810 E 2
3811 E 2
3812 E 2
3813 E 2
3814 E 3
3815 E 3
3816 E 3
3817 E 3
3818 E 4
3819 E 3
3820 E 3
3821 E 3
3900 G 2
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3902 D 2
3903 D 3
3904 D 3
3905 E 3
3906 E 3
3908 D 3
3909 D 3
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5201 G 6
5202 F 6
5600 G 8
5601 F 2
5602 F 3
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6102 E 7
6103 D 7
6104 D 7
6105 A 7
6106 D 7
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6110 C 7
6113 D 8
6200 C 7
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6202 G 5
6203 H 6
6301 F 1
6400 D 6
6401 D 6
6402 D 6
6403 D 6
6404 D 6
6405 D 6
6406 D 6
6407 D 6
6408 B 5
6600 C 7
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6700 H 5
6800 E 5
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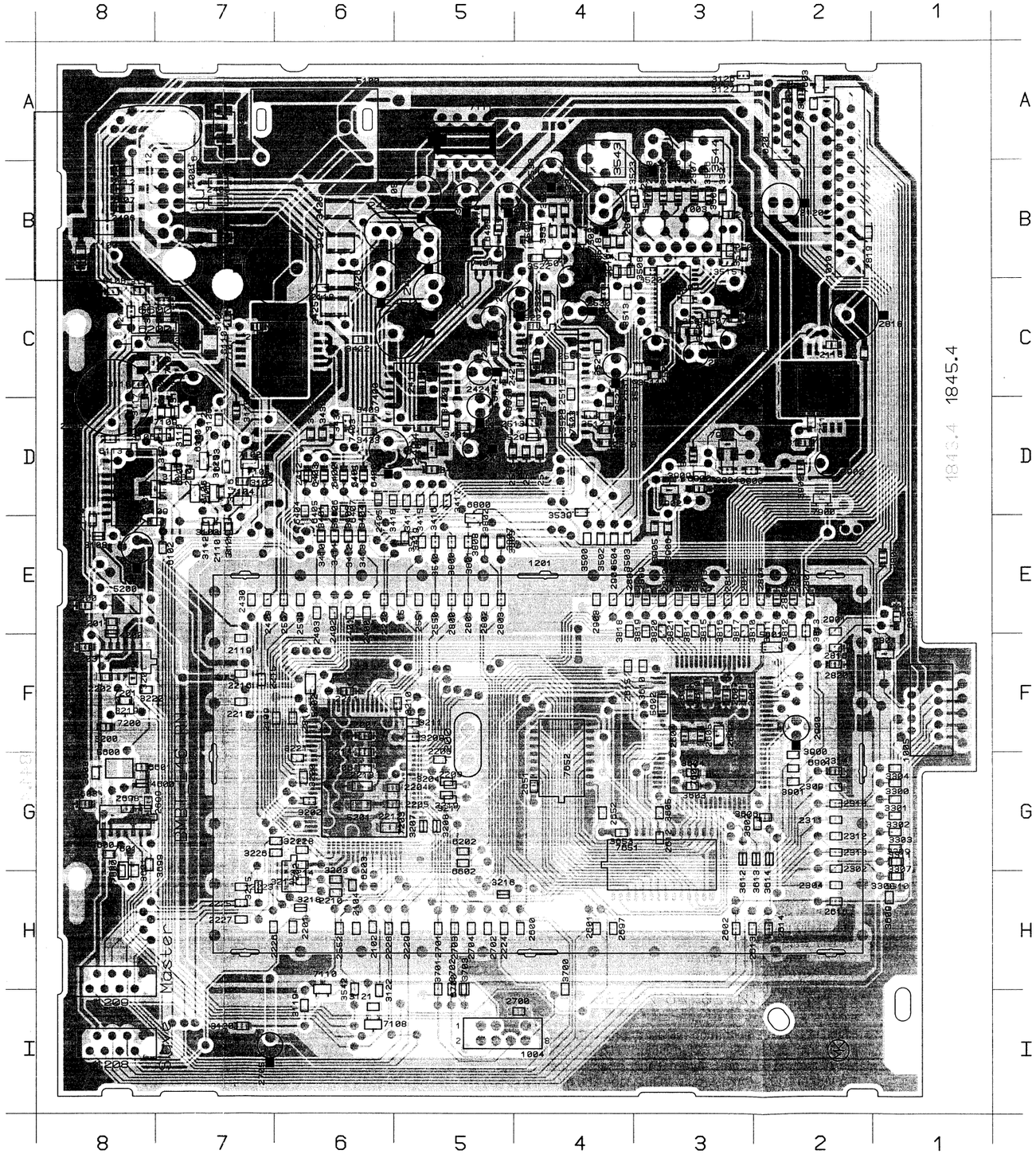
J205 E 4
J206 E 4
J300 B 7

MAIN-PWB B-SIDE VIEW



CONNECTORS

1001 A14	1004 F14	1005 C11	1010 E 6	1020 F11	2313 D 9	2807 C 2	3301 A 8	3802 F 8	3818 A 4	M310 B10	M706 G14	M812 E 5
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1001 B14	1004 G14	1005 D11	1010 E 6	1020 G11	2702 H14	2810 F 2	3307 A 8	3807 G10	3821 A 5	M313 A10	M802 G10	M815 E 5
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1001 C14	1005 A11	1010 B 6	1010 G 6	2303 D10	2800 G 8	2814 F 3	3311 A 9	3812 A 2	M302 A14	M317 C14	M806 B 5	M820 G 5
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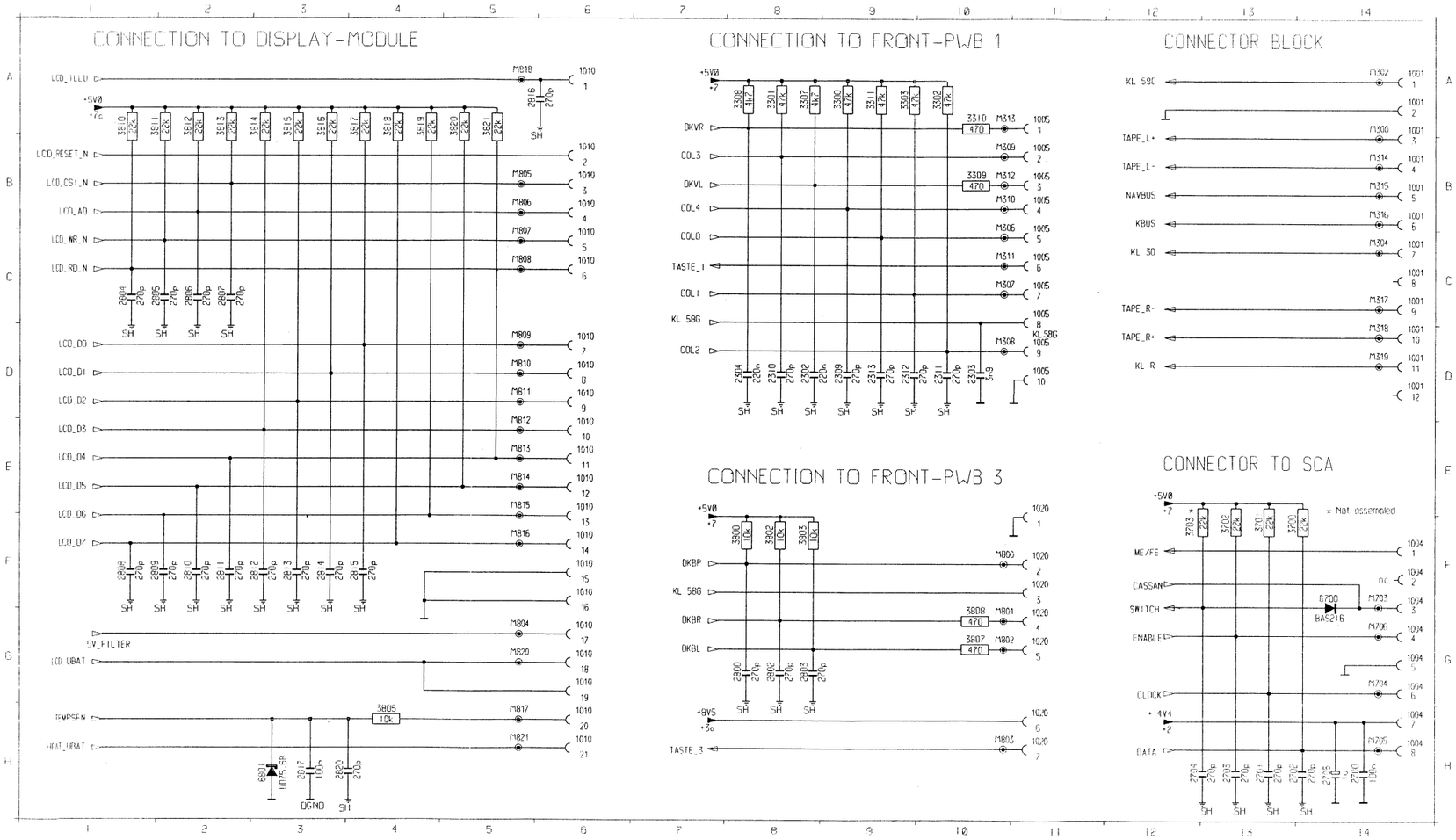

Values (approximate) at M817 in relation to temperature

T [°C]	U [V]
-40	4.94
-30	4.88
-20	4.80
-10	4.67
-0	4.49
+10	4.24
+20	3.94
+30	3.59
+40	3.20
+50	2.78
+60	2.39
+70	2.02
+80	1.69

TAPE-L+	(M300)	1.5 Veff at 235 Ω (measured with test tape 250 nW/m, 315 Hz)
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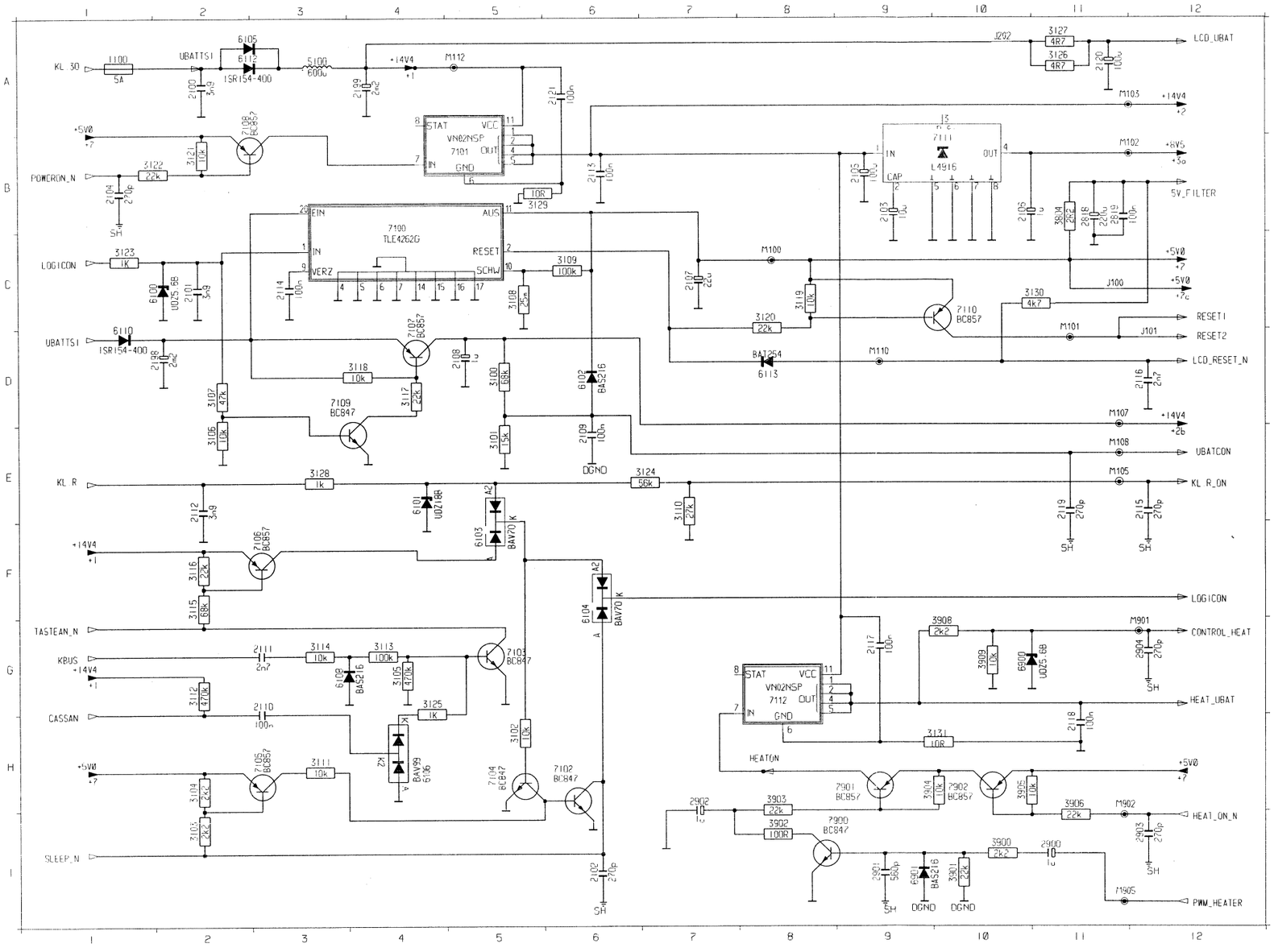
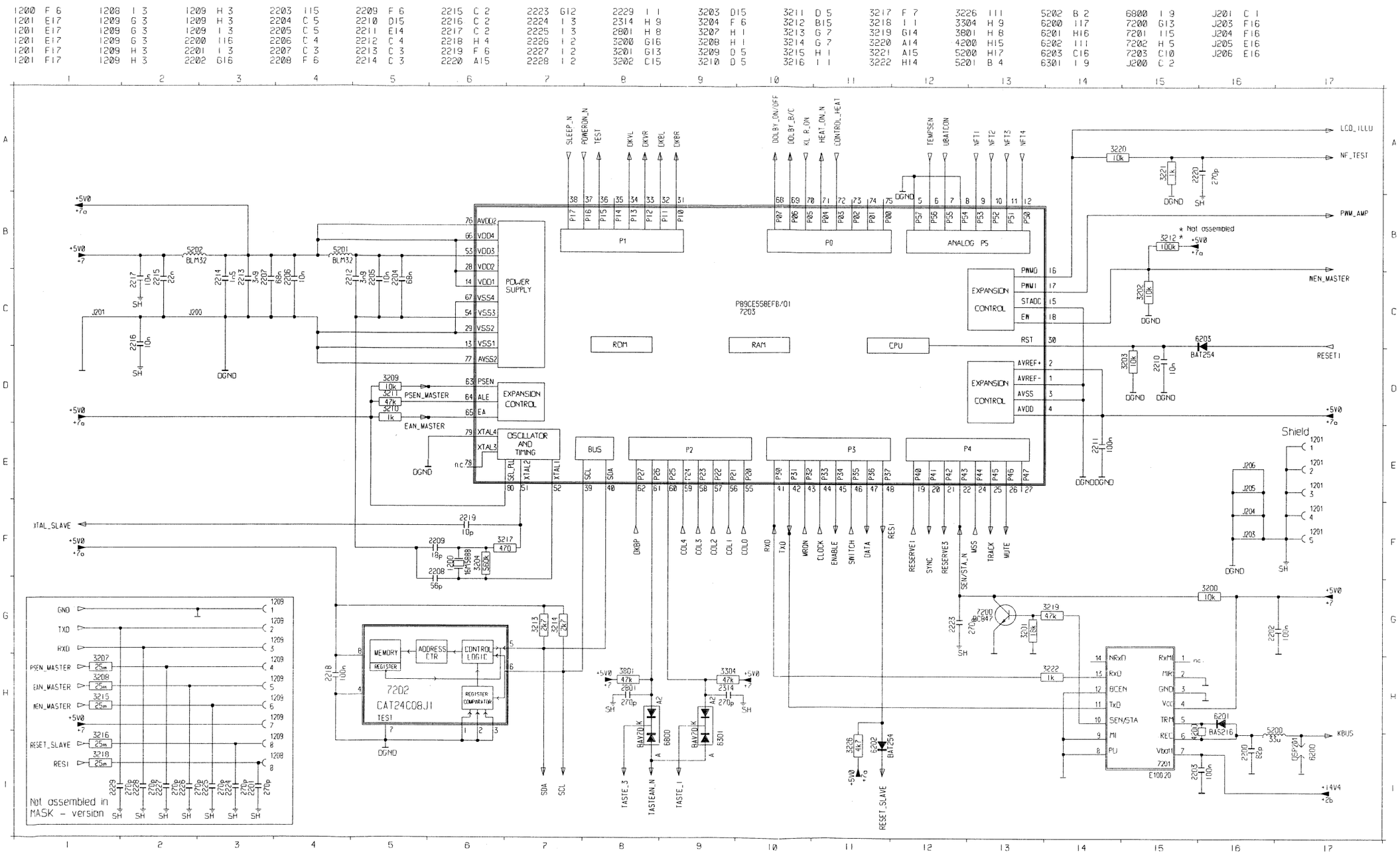
DKBR	(M801)	Opt. incr. switch right. Alternating: High.....High.....Low..... Low..... High a.s.o.
DKBL	(M802)	Opt. incr. switch left. Alternating: High.....Low..... Low..... High.....High a.s.o.
TASTE_3	(M803)	High (11.5 V) = Menu button released, Low = Menu button pushed
5V-FILTER	(M804)	5.0 V ±5%, max. 15 mA.Supply voltage for LCD controller interface.
LCD-CSI-N	(M805)	Chip select not signal (Low-activ)
LCD-A0	(M806)	Low -> LCD-00...07 are control data, High -> LCD-00...07 are display data
LCD-WR-N	(M807)	Write signal for LCD Controller (Low activ)
LCD-RD-N	(M808)	Read signal for LCD Controller (Low activ)
LCD-00...07	(M809...M816)	Control / Display signals for LCD
TEMPSEN	(M817)	Temperature related voltage from display for heater ON/OFF decision. $U_{25°C}$~3.8 V (see table)
LCD-ILLU	(M818)	PWM signal (2050 Hz) for ill. control. Low (<0.8 V) = ill. ON, High (>2.4 V) = ill. OFF. 0-100% in 256 steps
LCD-UBAT	(M820)	Supply voltage for LCD (Battery voltage)
HEAT-UBAT	(M821)	Heater supply. Low (< 0.2 V) = Heater OFF, High (Battery voltage) = Heater ON

POWER SUPPLY / ON-OFF LOGIC



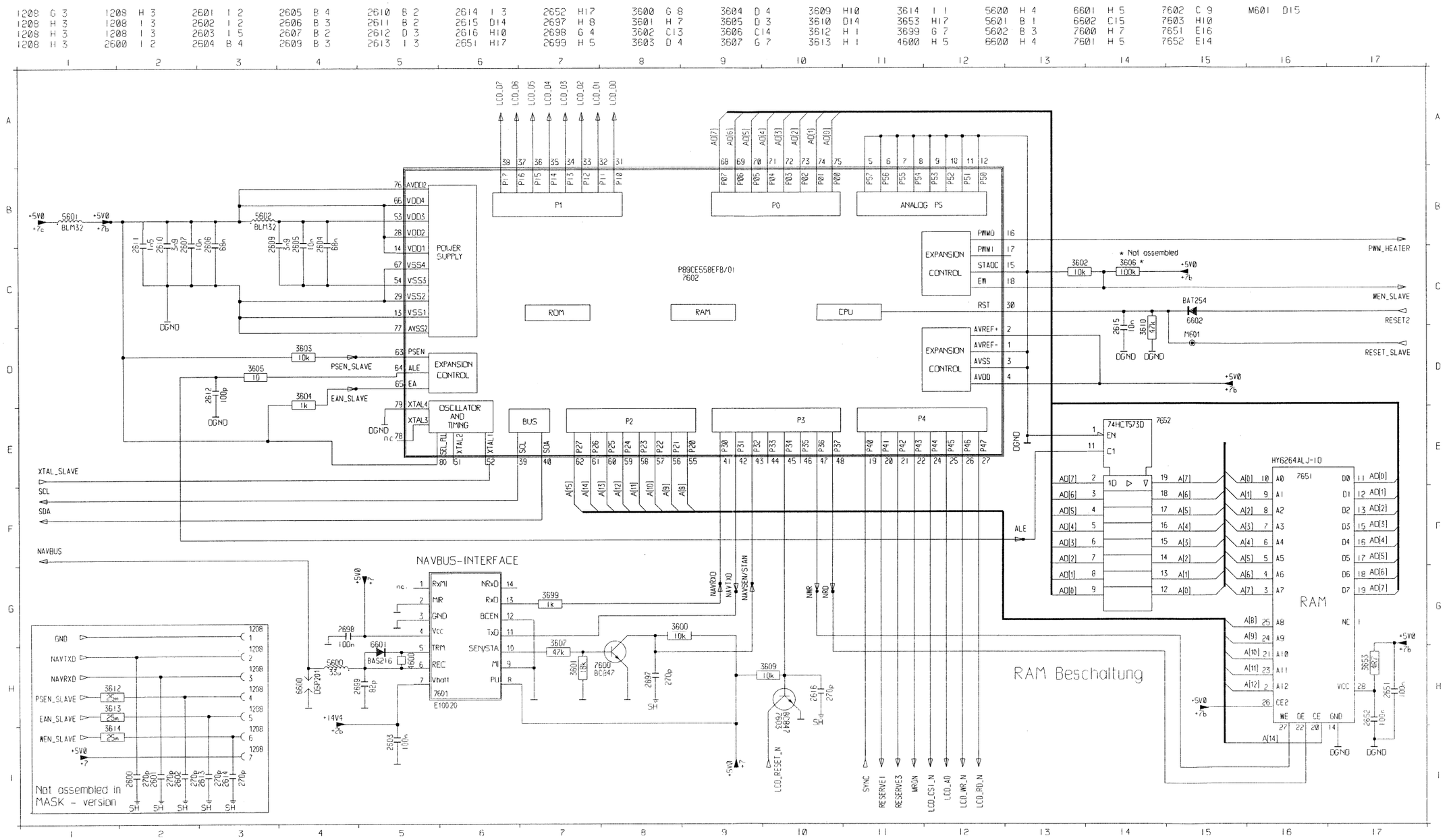
+5V0/+7	(M100)	5.0 V ±2%, max. 200 mA. Supply voltage for logic IC's and display.
RESET1	(M101)	Power reset signal for main CPU (min. 10ms high activ). Low < 0.8 V, High > 3.85 V
RESET2	(M101)	Power reset signal for slave CPU (min. 10ms high activ). Low < 0.8 V, High > 3.85 V
+8V5/+3a	(M102)	8.5 V ±5%, max. 250 mA. Supply voltage for AF and optical increment switch.
+14 V4/+2	(M103)	Battery voltage filtered, switched for AF Power, tape deck and 8.5V stabilizer IC
KL.R_ON	(M105)	Ignition ON / OFF control (high activ). 3.2 V when ignition ON
+14 V4/+2b	(M107)	Battery voltage filtered, switched for NAV-BUS and I/K-BUS.
UBATCON	(M108)	KL.R control voltage. Over-/undervoltage indication for switch OFF (<1.7V for KL.R=10V, >2.9V for KL.R=17V)
LCD_RESET_N	(M110)	Reset signal for LCD controller (min. 1µs low activ). Low < 0.75 V, High > 4.25 V
+14 V4/+1	(M112)	Battery voltage filtered
CONTROL_HEAT	(M901)	Heater ON/OFF control. Low = heater OFF, High = heater ON
HEAT_ON_N	(M902)	Heater ON/OFF switch. Low = Heater ON, High = Heater OFF
PWM_HEATER	(M905)	PWM signal to enable the heater circuit. Interrupts HEAT_ON_N in case of a hardware malfunction.
TASTEAN_N	(Trans. Pos.7103, Coll.)	Event switch ON signal. High = Menu or Eject released, Low = Menu or Eject pushed

MASTER PROCESSOR



NFT1...NFT4	(IC Pos.7203, Pins 9...12)	AF level for amplifying control
RESERVE1+3	(IC Pos.7203, Pin 19+21)	Reserved signal lines between main- and slave-controller (5.0 V level)
SYNC	(IC Pos.7203, Pin 20)	Handshake signal for synchronisation of main- and slave-CPU. High activ when unit starts up.
POWERON_N	(IC Pos.7203, Pin 37)	Control signal to switch supply voltages +8V5/+3a, HEAT-UBAT, +14V4/+2. Low = voltages ON
SLEEP_N	(IC Pos.7203, Pin 38)	Switch OFF signal (Low activ 3 ms) if KL-R OFF or I/K BUS not activ for 60 s.
SCL	(IC Pos.7203, Pin 39)	Clock signal for I2C BUS (5.0 V level)
SDA	(IC Pos.7203, Pin 40)	Data signal for I2C BUS (5.0 V level)
MRQN	(IC Pos.7203, Pin 43)	I2C BUS request line from slave controller (Low activ)

SLAVE PROCESSOR

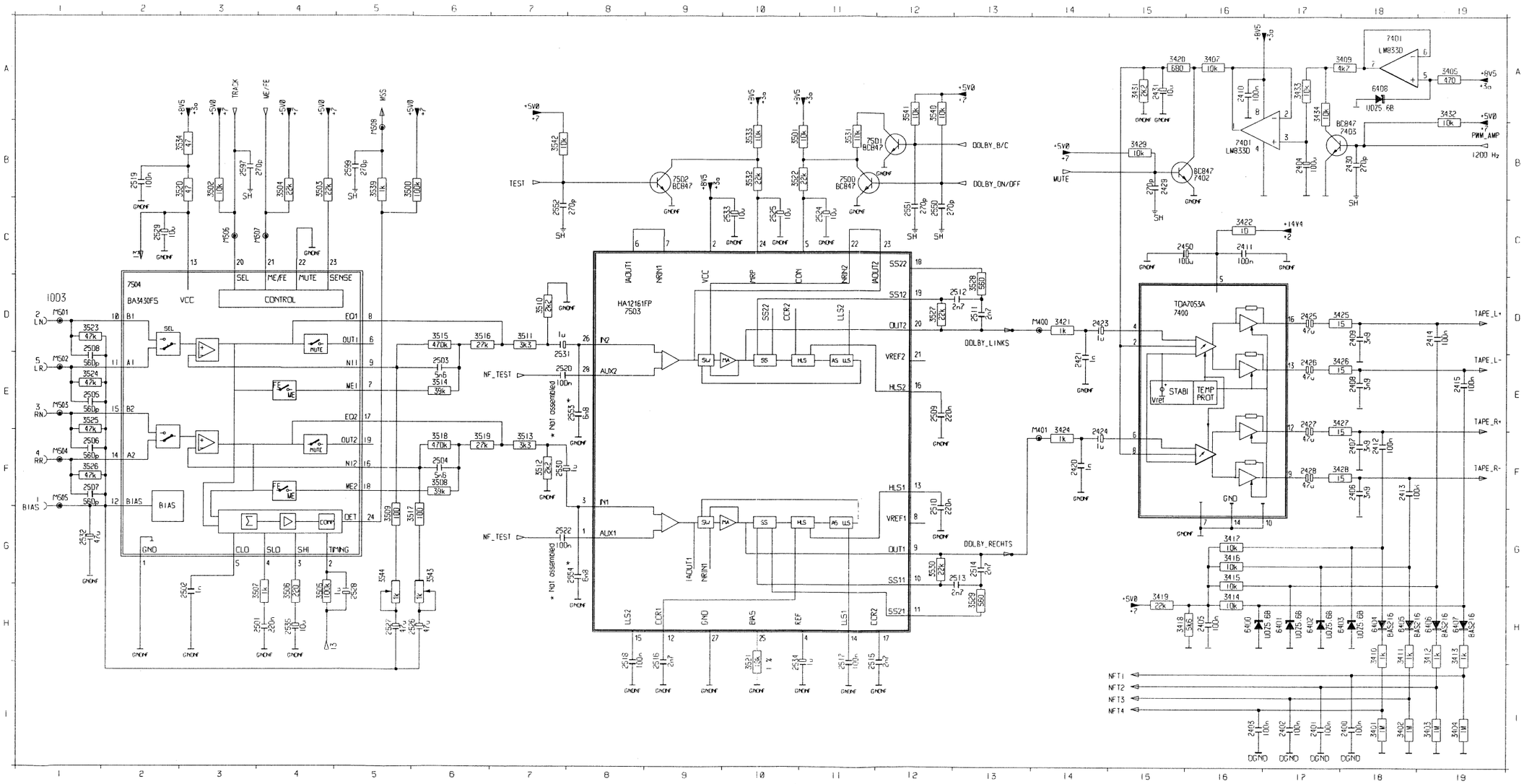


XTAL_SLAVE (IC Pos.7602, Pin 52) Tact frequency (16.5888 MHz) for main- and slave-CPU (DC ≈ 1.4 V)
RESET_SLAVE (M601) Logic reset signal from main CPU after power interruption. High activ.

DOLBY / AF

1003	D 1	2409	D18	2424	F14	2502	H 3	2512	D13	2524	C11	2534	H10	3402	I18	3414	H16	3425	D18	3501	B10
2400	I18	2410	A16	2425	D17	2503	E 6	2513	G13	2525	C10	2535	H 4	3403	I19	3415	G16	3426	E18	3502	B 3
2401	I17	2411	C16	2426	E17	2504	F 6	2514	G13	2526	H 6	2550	C12	3404	I19	3416	G16	3427	E18	3503	B 4
2402	I17	2412	F18	2427	E17	2505	E 1	2515	H11	2527	H 5	2551	C12	3405	A19	3417	G16	3428	F18	3504	B 4
2403	I16	2413	F18	2428	F17	2506	F 1	2516	H 9	2528	H 5	2552	C 7	3407	A16	3418	H15	3429	B15	3505	H 4
2404	B17	2414	D19	2429	B15	2507	F 1	2517	H11	2529	C 2	2553	E 8	3409	A18	3419	H 5	3431	A15	3506	H 4
2405	H16	2415	E19	2430	B18	2508	D 1	2518	H 8	2530	F 7	2554	G 8	3410	H18	3420	A 5	3432	A19	3507	H 4
2406	F18	2420	F14	2431	A15	2509	E12	2519	B 2	2531	D 7	2597	B 3	3411	H18	3421	D14	3433	A17	3508	F 6
2407	F18	2421	E14	2450	C15	2510	F12	2520	E 7	2532	G 1	2599	B 5	3412	H19	3422	C16	3434	A17	3509	G 5
2408	E18	2423	D14	2501	H 4	2511	D13	2522	G 7	2533	C10	3401	I18	3413	H19	3424	F 4	3500	B 5	3510	D 7

3511	D 7	3521	H10	3531	B11	6400	H16	7401	B16	M401	F14										
3512	F 7	3522	B10	3532	B10	6401	H17	7401	A18	M501	D 1										
3513	F 7	3523	D 1	3533	B10	6402	H17	7402	B16	M502	E 1										
3514	E 6	3524	E 1	3534	B 3	6403	H18	7403	B18	M503	E 1										
3515	G 6	3525	E 1	3539	B 5	6404	H18	7500	B11	M504	F 1										
3516	G 6	3526	F 1	3540	A12	6405	H18	7501	B12	M505	F 1										
3517	G 6	3527	D12	3541	A12	6406	H19	7502	B 9	M506	C 3										
3518	F 6	3528	D13	3542	B 7	6407	H19	7503	D 8	M507	C 4										
3519	G 6	3529	H13	3543	G 6	6408	A18	7504	D 2	M508	B 5										
3520	B 3	3530	G12	3544	G 5	7400	D15	M400	D14												

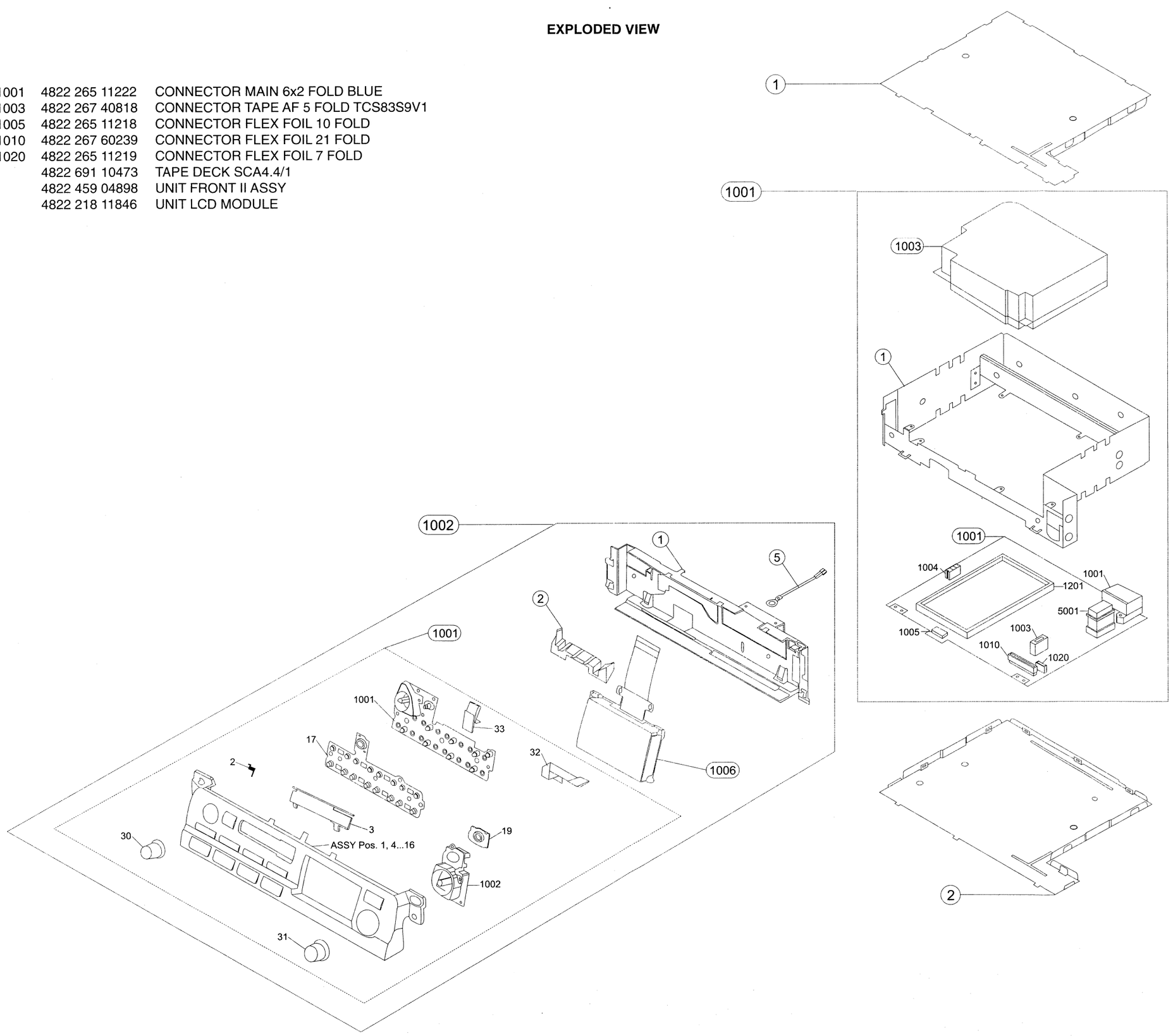


NF_TEST*	(IC Pos.7503, Pins 1+28)	PWM reference signal for AF level test
DOLBY_LINKS	(M400)	Dolby level left = 300mVeff (test tape 200nWb/m, 400Hz) to be aligned with poti 3544
DOLBY_RECHTS	(M401)	Dolby level right = 300mVeff (test tape 200nWb/m, 400Hz) to be aligned with poti 3543
LN	(M501)	Left channel, NOR direction (3.3 V DC)
LR	(M502)	Left channel, REV direction (3.3 V DC)
RN	(M503)	Right channel, REV direction (3.3 V DC)
RR	(M504)	Right channel, REV direction (3.3 V DC)
BIAS	(M505)	Common line of magnetic head (3.3 V DC)
TRACK	(M506)	Low = REV. direction, High = NOR. direction
ME/FE	(M507)	Low = FE, High = ME
MSS	(M508)	Low = NO modulation on tape, High = modulation on tape
MUTE	(Trans. Pos.7402, Base)	Preamplifier mute signal. Low (0.0 V) = AF out, High (0.7 V) = AF mutet
PWM_AMP	(Trans. Pos.7403, Base)	PWM signal for continuously amplifying control
DOLBY_ON/OFF	(Trans. Pos.7500, Base)	Low = DOLBY ON, High = DOLBY OFF
DOLBY_B/C	(Trans. Pos.7501, Base)	Low = DOLBY B, High = DOLBY C
TEST*	(Trans. Pos.7502, Base)	High (0.7 V) = NF_TEST disabled, Low = NF_TEST enabled (Dolby IC switched to AUX)

* only for production purposes

EXPLODED VIEW

1001-1001-1001	4822 265 11222	CONNECTOR MAIN 6x2 FOLD BLUE
1001-1001-1003	4822 267 40818	CONNECTOR TAPE AF 5 FOLD TCS83S9V1
1001-1001-1005	4822 265 11218	CONNECTOR FLEX FOIL 10 FOLD
1001-1001-1010	4822 267 60239	CONNECTOR FLEX FOIL 21 FOLD
1001-1001-1020	4822 265 11219	CONNECTOR FLEX FOIL 7 FOLD
1001-1003	4822 691 10473	TAPE DECK SCA4.4/1
1002-1001	4822 459 04898	UNIT FRONT II ASSY
1002-1006	4822 218 11846	UNIT LCD MODULE



MISCELLEANEOUS

1001	4822 265 11222	CON. 6x2 FOLD TYPE A BLUE
1003	4822 267 40818	CON. TCS83S9V1 BURNDY
1005	4822 265 11218	CON. BM H 10P F 1.00
1010	4822 267 60239	CON. 21 PINS
1020	4822 265 11219	CON. BM V 7P F 1.00
1100	4822 252 11302	FUSE SM T 5A
1200	4822 242 10802	QUARZ 16.588 800 MHZ

CAPACITORS

2100	4822 122 32566	CAP., CER. SMD	3,9NF	10%X7R	63V
2101	4822 122 32566	CAP., CER. SMD	3,9NF	10%X7R	63V
2102	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2103	4822 124 41017	CAP., ELEC. ALU.	10UF		16V
2104	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2105	4822 124 23255	CAP., ELEC. ALU.	100UF		16V
2106	4822 124 23282	CAP., ELEC. ALU.	1UF	20%	50V
2107	4822 124 23279	CAP., ELEC. ALU.	22UF	20%	16V
2108	4822 124 23282	CAP., ELEC. ALU.	1UF	20%	50V
2109	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2110	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2111	4822 122 32627	CAP., CER. WIRE	2.7NF	10%X7R	50V
2112	4822 122 32566	CAP., CER. SMD	3,9NF	10%X7R	63V
2113	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2114	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2115	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2116	4822 122 32627	CAP., CER. WIRE	2.7NF	10%X7R	50V
2117	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2118	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2119	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2120	4822 124 23255	CAP., ELEC. ALU.	100UF		16V
2121	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2198	4822 124 80769	CAP., ELEC. ALU.	2200UF	20%	16V
2199	4822 124 80769	CAP., ELEC. ALU.	2200UF	20%	16V
2200	4822 126 13695	CAP., CER. SMD	82PF	1%NP0	63V
2202	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2203	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2204	4822 126 13851	CAP., CER. SMD	68NF	10%	16V
2205	5322 122 34098	CAP., CER. SMD	10NF	10%X7R	63V
2206	5322 122 34098	CAP., CER. SMD	10NF	10%X7R	63V
2207	4822 126 13851	CAP., CER. SMD	68NF	10%	16V
2208	4822 126 13693	CAP., CER. SMD	56PF	1%NP0	63V
2209	4822 126 13689	CAP., CER. SMD	18PF	1%NP0	63V
2210	5322 122 34098	CAP., CER. SMD	10NF	10%X7R	63V
2211	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2212	4822 122 32566	CAP., CER. SMD	3,9NF	10%X7R	63V
2213	4822 122 32566	CAP., CER. SMD	3,9NF	10%X7R	63V
2214	5322 122 31865	CAP., CER. SMD	1,5NF	10%X7R	63V
2215	5322 122 32654	CAP., CER. SMD	22NF	10%X7R	63V
2216	5322 122 34098	CAP., CER. SMD	10NF	10%X7R	63V
2217	5322 122 34098	CAP., CER. SMD	10NF	10%X7R	63V
2218	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2219	5322 122 32448	CAP., CER. SMD	10PF	5%	50V
2220	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2223	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2228	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2229	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2302	4822 126 13849	CAP., CER. SMD	220NF	10%	16V
2303	4822 122 32566	CAP., CER. SMD	3,9NF	10%X7R	63V
2304	4822 126 13849	CAP., CER. SMD	220NF	10%	16V
2309	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2310	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2311	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2312	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2313	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2314	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2400	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2401	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2402	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2403	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2404	4822 124 80453	CAP., ELEC. ALU.	100UF	20%	10V
2405	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2406	4822 122 32566	CAP., CER. SMD	3,9NF	10%X7R	63V
2407	4822 122 32566	CAP., CER. SMD	3,9NF	10%X7R	63V
2408	4822 122 32566	CAP., CER. SMD	3,9NF	10%X7R	63V
2409	4822 122 32566	CAP., CER. SMD	3,9NF	10%X7R	63V
2410	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2411	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2412	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2413	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2414	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2415	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2420	5322 122 34123	CAP., CER. SMD	1NF	10%X7R	50V
2421	5322 122 34123	CAP., CER. SMD	1NF	10%X7R	50V
2423	4822 124 23282	CAP., ELEC. ALU.	1UF	20%	50V
2424	4822 124 23282	CAP., ELEC. ALU.	1UF	20%	50V
2425	4822 124 40433	CAP., ELEC. ALU.	47UF	20%	25V
2426	4822 124 40433	CAP., ELEC. ALU.	47UF	20%	25V
2427	4822 124 40433	CAP., ELEC. ALU.	47UF	20%	25V
2428	4822 124 40433	CAP., ELEC. ALU.	47UF	20%	25V
2429	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2430	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2431	4822 124 41017	CAP., ELEC. ALU.	10UF		16V
2450	4822 124 11952	CAP., ELEC. ALU.	100UF	20%	16V
2501	4822 126 13849	CAP., CER. SMD	220NF	10%	16V
2502	5322 122 34123	CAP., CER. SMD	1NF	10%X7R	50V
2503	4822 122 32646	CAP., CER. WIRE	5,6NF	10%X7R	50V
2504	4822 122 32646	CAP., CER. WIRE	5,6NF	10%X7R	50V
2505	5322 116 80853	CAP., CER. SMD	560PF	5%NP0	63V
2506	5322 116 80853	CAP., CER. SMD	560PF	5%NP0	63V
2507	5322 116 80853	CAP., CER. SMD	560PF	5%NP0	63V
2508	5322 116 80853	CAP., CER. SMD	560PF	5%NP0	63V
2509	4822 126 13849	CAP., CER. SMD	220NF	10%	16V
2510	4822 126 13849	CAP., CER. SMD	220NF	10%	16V
2511	4822 122 32627	CAP., CER. WIRE	2.7NF	10%X7R	50V
2512	4822 122 32627	CAP., CER. WIRE	2.7NF	10%X7R	50V
2513	4822 122 32627	CAP., CER. WIRE	2.7NF	10%X7R	50V
2514	4822 122 32627	CAP., CER. WIRE	2.7NF	10%X7R	50V
2515	4822 122 32627	CAP., CER. WIRE	2.7NF	10%X7R	50V
2516	4822 122 32627	CAP., CER. WIRE	2.7NF	10%X7R	50V
2517	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2518	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2519	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2520	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2522	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2524	4822 124 41017	CAP., ELEC. ALU.	10UF		16V
2525	4822 124 41017	CAP., ELEC. ALU.	10UF		16V
2526	4822 124 22646	CAP., ELEC. ALU.	47UF	20%	16V
2527	4822 124 22646	CAP., ELEC. ALU.	47UF	20%	16V
2528	4822 124 23282	CAP., ELEC. ALU.	1UF	20%	50V
2529	4822 124 41017	CAP., ELEC. ALU.	10UF		16V
2530	4822 124 23282	CAP., ELEC. ALU.	1UF	20%	50V
2531	4822 124 23282	CAP., ELEC. ALU.	1UF	20%	50V
2532	4822 124 22646	CAP., ELEC. ALU.	47UF	20%	16V
2533	4822 124 41017	CAP., ELEC. ALU.	10UF		16V
2534	4822 124 23282	CAP., ELEC. ALU.	1UF	20%	50V
2535	4822 124 41017	CAP., ELEC. ALU.	10UF		16V
2550	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2551	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2552	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2597	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2599	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2600	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2601	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2603	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2604	4822 126 13851	CAP., CER. SMD	68NF	10%	16V
2605	5322 122 34098	CAP., CER. SMD	10NF	10%X7R	63V
2606	4822 126 13851	CAP., CER. SMD	68NF	10%	16V
2607	5322 122 34098	CAP., CER. SMD	10NF	10%X7R	63V
2609	4822 122 32566	CAP., CER. SMD	3,9NF	10%X7R	63V
2610	4822 122 32566	CAP., CER. SMD	3,9NF	10%X7R	63V
2611	5322 122 31865	CAP., CER. SMD	1,5NF	10%X7R	63V
2612	5322 122 32531	CAP., CER. SMD	100PF	5%NP0	50V
2615	5322 122 34098	CAP., CER. SMD	10NF	10%X7R	63V
2616	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2651	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2652	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2697	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2698	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2699	4822 126 13695	CAP., CER. SMD	82PF	1%NP0	63V
2700	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2701	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2702	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2703	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2704	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2705	4822 124 23282	CAP., ELEC. ALU.	1UF	20%	50V
2800	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2801	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2802	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2803	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2804	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2805	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2806	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2807	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2808	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2809	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2810	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2811	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2812	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2813	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2814	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2815	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2816	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2817	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2818	4822 124 23582	CAP., ELEC. ALU.	220UF		10V
2819	4822 126 13196	CAP., CER. SMD	100NF	10%X7R	25V
2820	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2900	4822 124 23282	CAP., ELEC. ALU.	1UF	20%	50V
2901	5322 116 80853	CAP., CER. SMD	560PF	5%NP0	63V
2902	4822 124 23282	CAP., ELEC. ALU.	1UF	20%	50V
2903	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V
2904	4822 122 33216	CAP., CER. SMD	270PF	5%NP0	50V

RESISTORS AND JUMPERS

3100	4822 051 20683	RES., CHIP <20W	68K00	5%	0.1W
3101	4822 051 20153	RES., CHIP <20W	15K00	5%	0.1W
3102	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3103	4822 117 11449	RES., CARBON	2K2	1%	0.1W
3104	4822 117 11449	RES., CARBON	2K2	1%	0.1W
3105	4822 051 20474	RES., CHIP <20W	470K00	5%	0.1W
3106	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3107	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3108	4822 051 20008	RES., CHIP <20W	0R00 JUMP. (0805)		
3109	4822 051 20104	RES., CHIP <20W	100K00	5%	0.1W
3110	4822 051 20273	RES., CHIP <20W	27K00	5%	0.1W
3111	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3112	4822 051 20474	RES., CHIP <20W	470K00	5%	0.1W
3113	4822 051 20104	RES., CHIP <20W	100K00	5%	0.1W
3114	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3115	4822 051 20683	RES., CHIP <20W	68K00	5%	0.1W
3116	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3117	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3118	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3119	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3120	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3121	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3122	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3123	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3124	4822 051 20563	RES., CHIP <20W	56K00	5%	0.1W
3125	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3126	4822 051 20478	RES., CHIP <20W	4R70	5%	0.1W
3127	4822 051 20478	RES., CHIP <20W	4R70	5%	0.1W
3128	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3129	4822 051 20109	RES., CHIP <20W	10R00	5%	0.1W
3130	4822 051 20472	RES., CHIP <20W	4K70	5%	0.1W
3131	4822 051 20109	RES., CHIP <20W	10R00	5%	0.1W
3200	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3201	4822 117 10965	RES., CHIP <20W	18K	1%	0.1W
3202	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3203	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3204	4822 051 20564	RES., CHIP <20W	560K00	5%	0.1W
3209	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3210	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3211	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3213	4822 117 12955	RES., CHIP <20W	2K7	5%	0.1W
3214	4822 117 12955	RES., CHIP <20W	2K7	5%	0.1W
3217	4822 051 20471	RES., CHIP <20W	470R00	5%	0.1W
3219	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3220	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3221	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3222	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3226	4822 051 20472	RES., CHIP <20W	4K70	5%	0.1W
3300	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3301	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3302	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3303	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3304	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3307	4822 051 20472	RES., CHIP <20W	4K70	5%	0.1W
3308	4822 051 20472	RES., CHIP <20W	4K70	5%	0.1W
3309	4822 051 20471	RES., CHIP <20W	470R00	5%	0.1W
3310	4822 051 20471	RES., CHIP <20W	470R00	5%	0.1W
3311	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3401	4822 051 20105	RES., CHIP <20W	1M00	5%	0.1W
3402	4822 051 20105	RES., CHIP <20W	1M00	5%	0.1W
3403	4822 051 20105	RES., CHIP <20W	1M00	5%	0.1W
3404	4822 051 20105	RES., CHIP <20W	1M00	5%	0.1W
3405	4822 051 20471	RES., CHIP <20W	470R00	5%	0.1W
3407	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3409	4822 051 20472	RES., CHIP <20W	4K70	5%	0.1W
3410	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3411	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3412	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3413	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3414	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3415	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3416	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3417	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3418	4822 051 20562	RES., CHIP <20W	5K60	5%	0.1W
3419	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3420	4822 051 20681	RES., CHIP <20W	680R00	5%	0.1W
3421	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3422	4822 051 20109	RES., CHIP <20W	10R00	5%	0.1W
3424	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3425	4822 117 12972	RES., CHIP <20W	15R0	5%	1W
3426	4822 117 12972	RES., CHIP <20W	15R0	5%	1W
3427	4822 117 12972	RES., CHIP <20W	15R0	5%	1W
3428	4822 117 12972	RES., CHIP <20W	15R0	5%	1W
3429	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3430	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3431	4822 117 11449	RES., CARBON	2K2	1%	0.1W
3432	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3433	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3434	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3500	4822 051 20104	RES., CHIP <20W	100K00	5%	0.1W
3501	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3502	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3503	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3504	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3505	4822 051 20104	RES., CHIP <20W	100K00	5%	0.1W
3506	4822 117 11503	RES., CHIP <20W	220R	1%	0.1W
3507	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3508	4822 051 20393	RES., CHIP <20W	39K00	5%	0.1W
3509	4822 051 20101	RES., CHIP <20W	100R00	5%	0.1W
3510	4822 117 11449	RES., CARBON	2K2	1%	0.1W
3511	4822 051 20332	RES., CHIP <20W	3K30	5%	0.1W
3512	4822 117 11449	RES., CARBON	2K2	1%	0.1W
3513	4822 051 20332	RES., CHIP <20W	3K30	5%	0.1W
3514	4822 051 20393	RES., CHIP <20W	39K00	5%	0.1W
3515	4822 051 20474	RES., CHIP <20W	470K00	5%	0.1W
3516	4822 051 20273	RES., CHIP <20W	27K00	5%	0.1W
3517	4822 051 20101	RES., CHIP <20W	100R00	5%	0.1W
3518	4822 051 20474	RES., CHIP <20W	470K00	5%	0.1W
3519	4822 051 20273	RES., CHIP <20W	27K00	5%	0.1W
3520	4822 051 20479	RES., CHIP <20W	47R00	5%	0.1W
3521	4822 117 10965	RES., CHIP <20W	18K	1%	0.1W
3522	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3523	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3524	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3525	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3526	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W

3527	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3528	4822 051 20561	RES., CHIP <20W	560R00	5%	0.1W
3529	4822 051 20561	RES., CHIP <20W	560R00	5%	0.1W
3530	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3531	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3532	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3533	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3534	4822 051 20479	RES., CHIP <20W	47R00	5%	0.1W
3539	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3540	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3541	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3542	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3543	4822 101 11187	RES., VAR. <20W	1K	30%LIN	0,1W
3544	4822 101 11187	RES., VAR. <20W	1K	30%LIN	0,1W
3600	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3601	4822 117 10965	RES., CHIP <20W	18K	1%	0.1W
3602	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3603	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3604	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3605	4822 051 20109	RES., CHIP <20W	10R00	5%	0.1W
3607	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3609	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3610	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3653	4822 051 20478	RES., CHIP <20W	4R70	5%	0.1W
3699	4822 051 20102	RES., CHIP <20W	1K00	5%	0.1W
3700	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3701	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3702	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3800	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3801	4822 117 10834	RES., CHIP <20W	47K	1%	0.1W
3802	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3803	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3804	4822 051 20228	RES., CHIP <20W	2R20	5%	0.1W
3805	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3807	4822 051 20471	RES., CHIP <20W	470R00	5%	0.1W
3808	4822 051 20471	RES., CHIP <20W	470R00	5%	0.1W
3810	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3811	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3812	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3813	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3814	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3815	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3816	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3817	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3818	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3819	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3820	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3821	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3900	4822 117 11449	RES., CARBON	2K2	1%	0.1W
3901	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3902	4822 051 20101	RES., CHIP <20W	100R00	5%	0.1W
3903	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3904	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3905	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
3906	4822 051 20223	RES., CHIP <20W	22K00	5%	0.1W
3908	4822 117 11449	RES., CARBON	2K2	1%	0.1W
3909	4822 117 10833	RES., CHIP <20W	10K	1%	0.1W
4200	4822 051 20008	RES., CHIP <20W	0R00 JUMP. (0805)		
4600	4822 051 20008	RES., CHIP <20W	0R00 JUMP. (0805)		

COILS

5100	4822 157 71259	FILTER CU15B2
5200	4822 157 10396	LQH4N 33U 10%
5201	4822 157 71267	BLM31BG01SPT
5202	4822 157 71267	BLM31BG01SPT
5600	4822 157 10396	LQH4N 33U 10%
5601	4822 157 71267	BLM31BG01SPT
5602	4822 157 71267	BLM31BG01SPT

DIODES

6100	4822 130 10185	REFERENCE	UDZ5.6B
6101	4822 130 11152	REFERENCE	UDZ18B
6102	4822 130 83757	BAS216	
6103	5322 130 34331	BAV70	
6104	5322 130 34331	BAV70	
6105	5322 130 10675	POWER REC.	MBRS1100
6106	5322 130 34337	BAV99	
6108	4822 130 83757	BAS216	
6110	4822 130 10655	POWER REC.	1SR154-400
6113	4822 130 10654	BAT254	
6200	4822 252 60125	SPARK GAP	DSP-201M-A21F
6202	4822 130 10654	BAT254	
6203	4822 130 10654	BAT254	
6301	5322 130 34331	BAV70	
6400	4822 130 10185	REFERENCE	UDZ5.6B
6401	4822 130 10185	REFERENCE	UDZ5.6B
6402	4822 130 10185	REFERENCE	UDZ5.6B
6403	4822 130 10185	REFERENCE	UDZ5.6B
6404	4822 130 83757	BAS216	
6405	4822 130 83757	BAS216	
6406	4822 130 83757	BAS216	
6407	4822 130 83757	BAS216	
6408	4822 130 10185	REFERENCE	UDZ5.6B
6600	4822 252 60125	SPARK GAP	DSP-201M-A21F
6602	4822 130 10654	BAT254	
6700	4822 130 83757	BAS216	
6800	5322 130 34331	BAV70	
6801	4822 130 10185	REFERENCE	UDZ5.6B
6900	4822 130 10185	REFERENCE	UDZ5.6B
6901	4822 130 83757	BAS216	

TRANSISTORS AND IC's

7100	4822 209 33883	TLE4262G
7101	4822 209 15979	VN02NSP
7102	4822 130 60511	BC847B
7103	4822 130 60511	BC847B
7104	4822 130 60511	BC847B
7105	5322 130 60508	BC857B
7106	5322 130 60508	BC857B
7107	5322 130 60508	BC857B
7108	5322 130 60508	BC857B
7109	4822 130 60511	BC847B
7110	5322 130 60508	BC857B
7111	4822 209 72227	L4916
7112	4822 209 15979	VN02NSP
7200	4822 130 60511	BC847B
7201	4822 209 15825	E100.20B
7202	4822 209 15627	ST24C08M6
7203	4822 209 16194	P87CE560EFB/144
7400	4822 209 16193	TDA7053AT
7401	4822 209 30095	LM833D
7402	4822 130 60511	BC847B
7403	4822 130 60511	BC847B
7500	4822 130 60511	BC847B
7501	4822 130 60511	BC847B
7502	4822 130 60511	BC847B
7503	4822 209 33636	HA12161FP
7504	4822 209 33884	BA3430FS
7600	4822 130 60511	BC847B
7601	4822 209 15825	E100.20B
7602	4822 209 16195	P87CE560EFB/145
7603	4822 130 60511	BC847B
7652	5322 209 31276	SN74HCT573DW
7900	4822 130 60511	BC847B
7901	5322 130 60508	BC857B
7902	5322 130 60508	BC857B

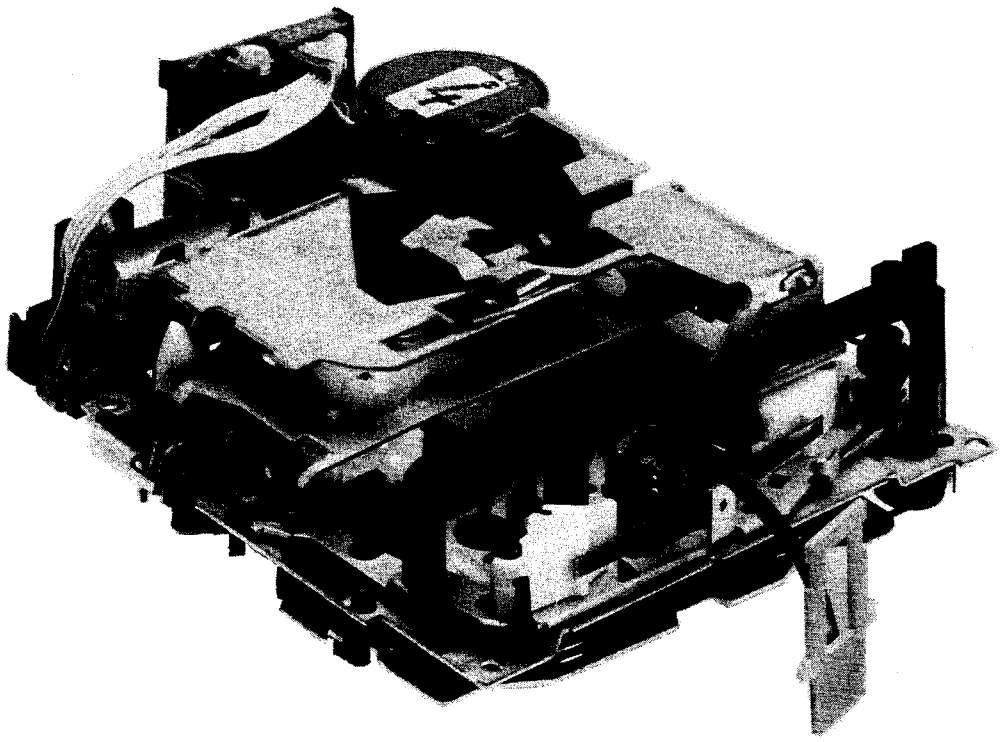
Car cassette deck SCA

Version 4.4

Service
Service
Service

Service Manual

12 V



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MECHANICAL SPECIFICATION

Operating positions:	Any position from horizontal to 45° standing vertically on the rear side.
Operating temperature:	-20°C to +70°C
Tape speed:	4,76 cm/sec
Wow and flutter:	< 0,5% unweighted
	< 0,3% weighted
Winding time:	
Test tape: RCA 118 (C60)	< 110 sec
Eject and loading time:	< 2 sec

ELECTRICAL SPECIFICATION

Voltage:	min 10,6 V max 16,0 V
Current - playback:	200 mA
Current - fast wind:	150 mA
Current - eject, standby:	100 µA
Hold in voltage:	8,0 V
Capstan motor:	14,4 V
Servo motor:	2 V DC Play
	11,5 V DC Fast, Servo
Playback Crosstalk	
ch. 1 - 2 / 3 - 4	> 36 dB
ch. 2 - 3	> 46 dB

FEATURES

The SCA-4.4 tape deck is usable in several sets. Most of the control functions depend on the hard- and software-configuration of the set in which the deck is installed.
The set µC can control soft eject, emergency eject, standby mode, reverse function, MSS, ME/FE and DOLBY indication.
Some versions of the deck could be equipped with a groved head and/or a preamplifier circuit.

HANDLING AND DEMOUNTING INSTRUCTIONS

GENERAL

- Protect the tape deck against ESD !
- Plastic catches and snap connections must be released careful with screwdriver or tweezers.
- Cables must be laid in the defined cable guidings after mounting.
- For lubrication see indications in the exploded view.
- To clean tape transport and head only use moist cleaning tapes or piece of cloth, take care that no fluid (alcohol) drops into the bearing.
- For transport lift/carrier assy must be in eject position, do not carry the deck by touching the lift/carrier.
- Use a screwdriver 2,5 mm with insulated shaft for adjusting drift.
- Screw the deck into the set in order: Front right, front left, rear left, rear right.

DEMOUNTING

1. Carrier/lift (44)
1.1 Lift in eject position - put leg of eject spring (12) into mounting position acc. fig. 8 and fig. 2 - J
1.2 Lift in play position - unclamp cassette holder (49) from eject lever (48) with a left-upwards motion acc. fig.1-B
1.3 Lift in eject position - push plastic hook (fig.1-D) and pull out eject lever, remember position of ejector spring (55) and switching pin (54) for re-assembly later on
1.4 Release fixation lever (fig.1-F) by clicking out in left direction and then turn to the right
1.5 Lift in mid position - take out carrier and lift by releasing plastic hooks at the left (fig.1-G)

2. Head support
2.1 Take out carrier/lift according 1.
2.2 Remove head carrier spring (37)
2.3 Turn head support fixation lever acc. fig.3-A
2.4 Position pin of switching lever (20) to max. left point, see fig.3-detail I
2.5 Release plastic snapper (fig.3-H) and take out head support assembly
!!! TAKE CARE NOT TO BENT THE HEAD CARRIER !!!
2.6 Press plastic fixation (fig.3-detail E,F) and take out magnetic head
2.7 Push pressure spring (27) acc. fig.3-D and move it out
2.8 Release plastic hooks (fig.3-B,C) to pull pinch rollers (45+68) out
2.9 Take off anchor spring (13), rotate anchor (2) 90°degrees to take it out (fig.4-A,B,C)

3. Capstan motor (32)
Remove belt (30) from driving wheel, desolder connection cables, unscrew the two torx screws at the bottom of chassis and take out capstan motor
!!! TAKE CARE OF CORRECT AND UNTWISTED MOUNTING OF THE BELT !!!

4. Servo motor (14)
Desolder connection cables and lever up motor out of its clamps (fig.2-F,G)

5. Clutch assy (57-59)
5.1 Remove servo motor acc. 4.
5.2 Cut disk (65) and remove it (must be renewed)
5.3 Pull clutch from the axle (fig.2-H,I)

6. Anchor holder (8) and magnet double (1)
6.1 Desolder cables of magnet
6.2 Swivel anchor holder counter-clockwise and press it off applying force near the pivoting point
6.3 Release plastic clamps of magnet holder and press magnet out from top of the chassis (fig.4-E)

7. Driving belt (30), flywheels (23) and bearings (70)
7.1 Release pivot plate (35) by turning the plastic hooks acc.fig.5-A,B
7.2 Remove pivot plate and driving belt
7.3 Pull out flywheels
7.4 Press bearings out of plastic housings from top side of chassis plate, use a plastic tool with diameter 4mm in order not to damage the housings
7.5 After mounting new flywheels, bearings or pivot plate you have to test wow and flutter because every deck is adjusted individual for these components. If the values of wow and flutter are out of specification, you have to exchange complete deck !
7.6 Degrease capstan axis after re-mounting the flywheels

8. Connection wheel (5), take up wheels (6), backtension springs (69)
8.1 Take out carrier/lift acc. 1.
8.2 Lever up connection wheel from axle (must be renewed)
8.3 Cut disks (65) and remove them (must be renewed)
8.4 Unclamp and pull up wheels with puller (fig.2-A,B)
8.5 Take out backtension springs

9. ME/CR Switch (60)
9.1 Desolder connection cables
9.2 Push with a small pin through the hole at the bottom of the chassis, directly under the switch

10. ON/OFF Switch (26)
10.1 Desolder connection cables
10.2 Lever up switch or push with a small pin through the hole at the bottom of the chassis, directly under the switch if servo motor and clutch were removed previously

11. Control pins (16), gear lever (17), play reverse lever (18)
11.1 Remove flywheels acc. 7
11.2 Remove play reverse lever
11.3 Put control pins into mounting position acc. fig.6-D,E
11.4 Take out gear lever
11.5 Pull out control pins

12. Switching lever (20), swivel wheel assembly (7,15,43)
12.1 Release spring (53) from black plastic pin
12.2 Turn switching lever acc. fig.7-A
12.3 Lever up switching lever from axle
12.4 Remove connection wheel acc. 8
12.5 Take out swivel wheel assembly

13. Switching pin (54), transport rod (25), latch (21)
13.1 Remove ON/OFF Switch acc. 10
13.2 Lever up switching pin from axle
13.3 Remove switching lever acc. 12
13.4 Move out transport rod and latch

TOOLS REQUIRED

Test cassette SBC 420	4822 397 30071
Test cassette SBC 419	4822 397 30069
Friction test cassette	4822 395 30054
Puller for clutch (fig.2)	4822 395 60039

ADJUSTMENTS

TORQUE OF REELS (FRICTION)

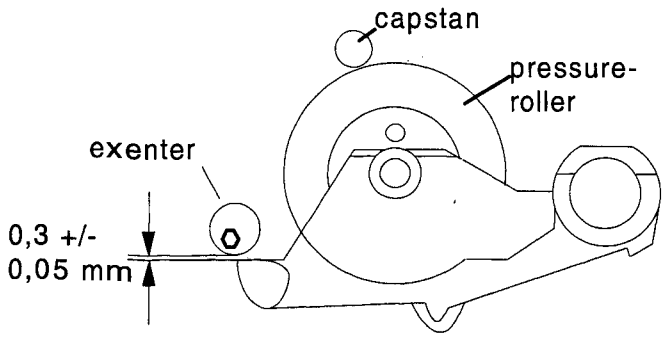
Adjust potmeter pos. 3409 until friction test cassette shows 9,5 +/- 1,5 mNm in NOR direction (after 2 minutes) and 8,5 +/- 1,5 mNm in REV direction. Backtension must be 0,3 to 0,7 mNm.
If values deviate check lubrication, clutch, take up wheels and backtension springs.

WOW AND FLUTTER, TAPE SPEED

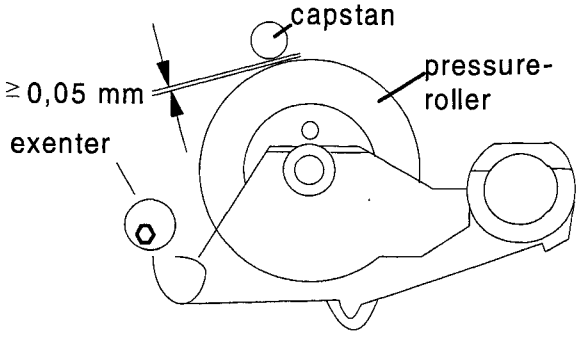
Connect wow and flutter meter to loudspeaker outputs and play the 3150 Hz signal track of test cassette SBC 420. Value should be max. 0,5% (unweighted).
If value deviates check motors, pressure rollers, flywheels, belt, pulley and backtension springs.
Tape speed can be adjusted with motor potentiometer A (see fig.8). Use a screwdriver with insulated shaft !

PRESSURE ROLLER / CAPSTAN (see figures below)

Adjust clearance play-NOR position between pressure roller and stop head carrier



Adjust clearance FFW position between pressure roller and capstan



SCA-4.4

EJECTOR 48, HOLDER 49, LIFT 44

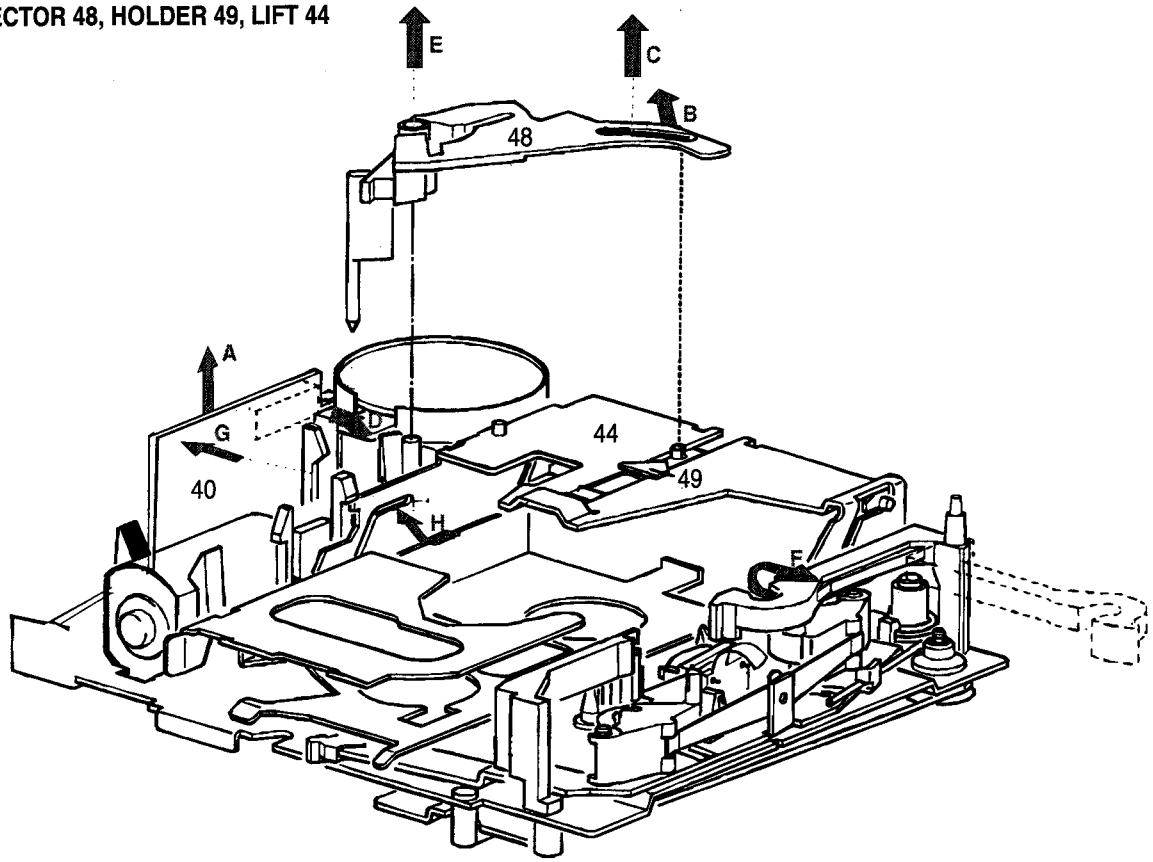


Fig. 1

CLUTCH 59, SWITCH 60, GEAR WHEEL 5, CARRIER 6

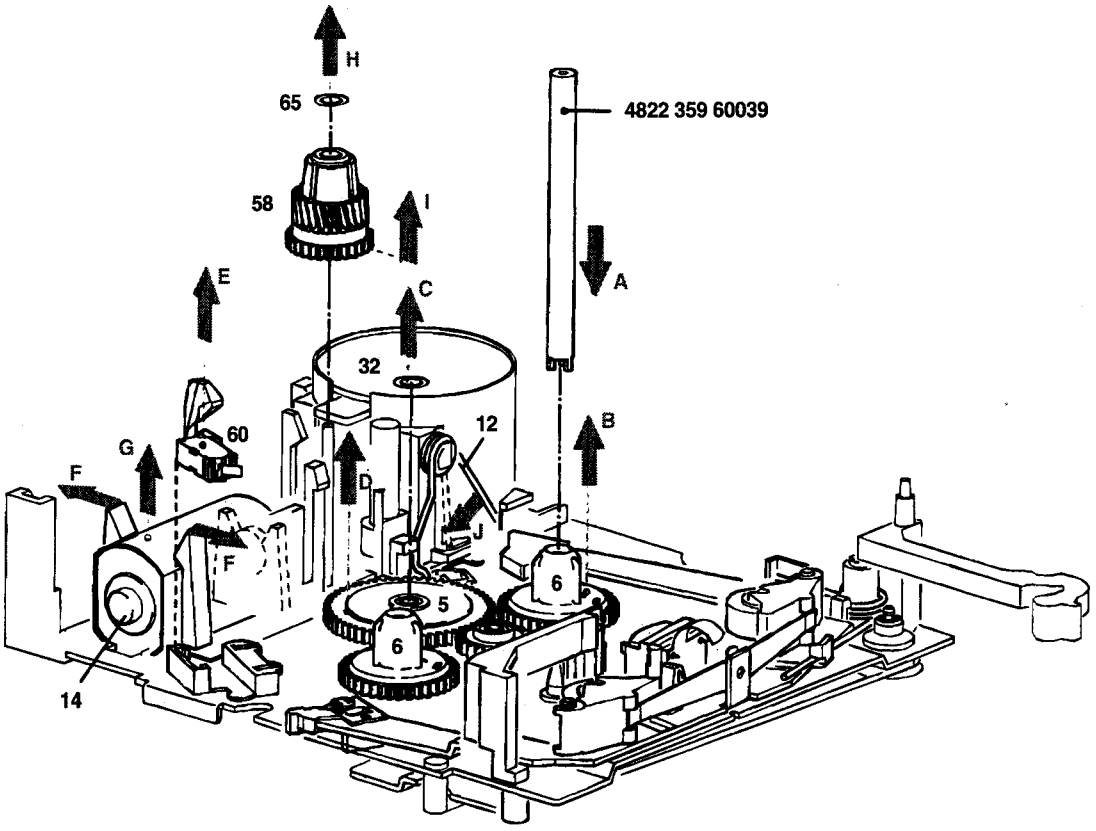


Fig. 2

PRESSURE ROLLER 45, HEAD BRACKET 33, HEAD 34

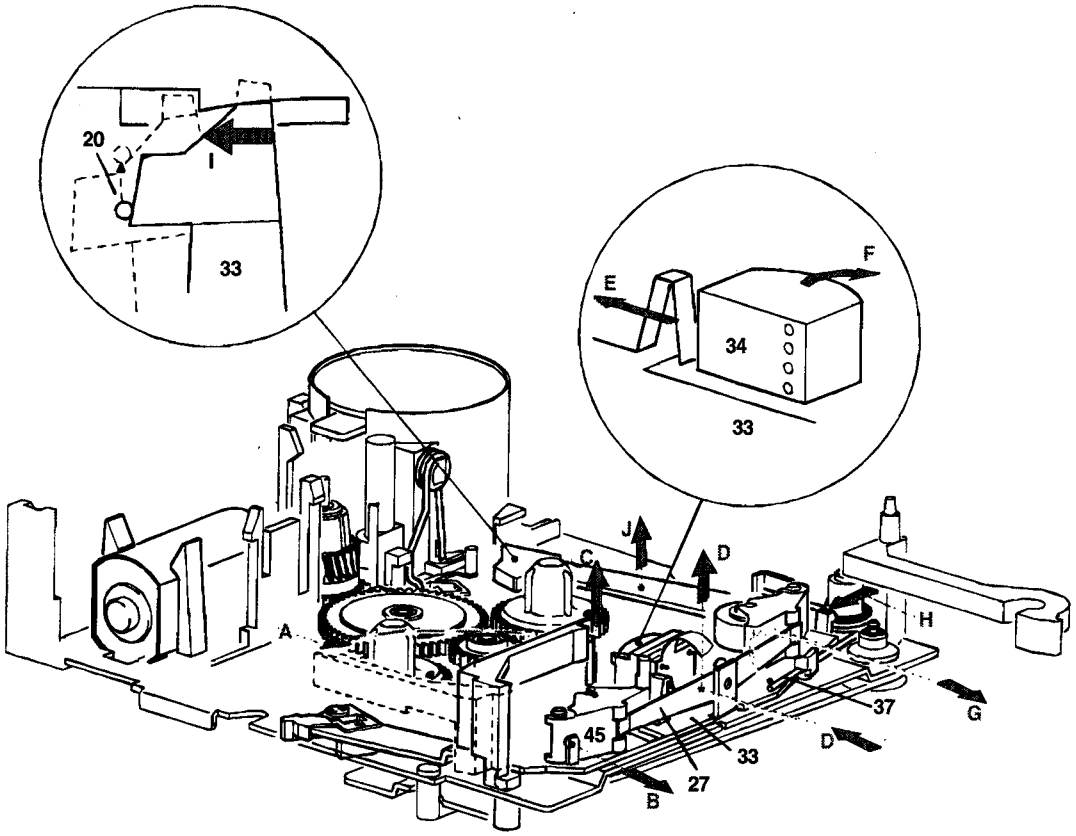


Fig. 3

ANCHOR 3/5, RELAY 1

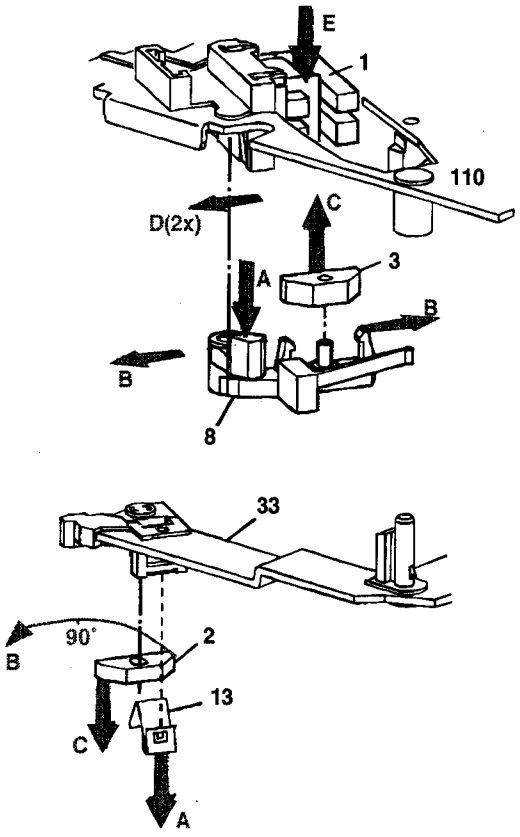


Fig. 4

FLYWHEEL 23, BELT 30

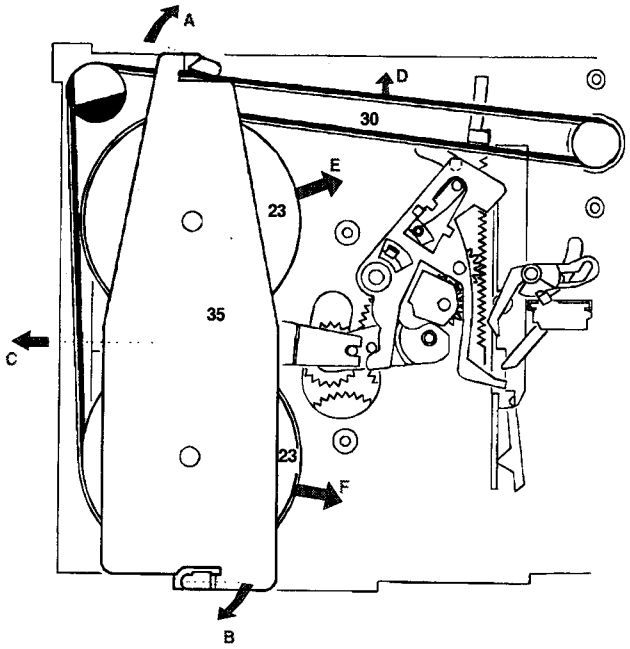


Fig. 5

SEGMENT 16, BRACKET 17, BEARING 70

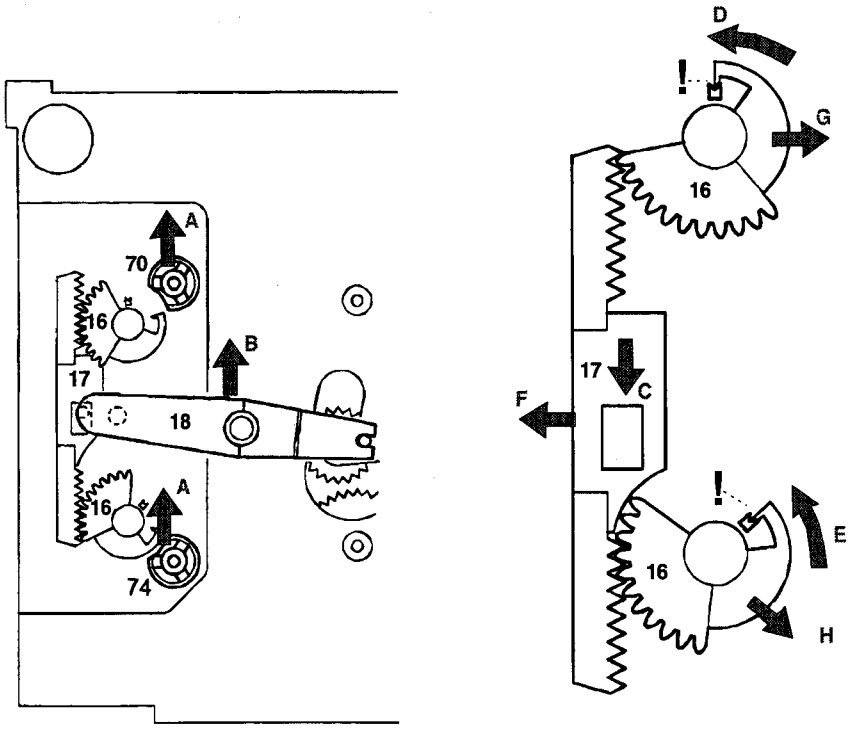


Fig. 6

SWITCH 26, SWIVEL GEAR 7, LEVER 20

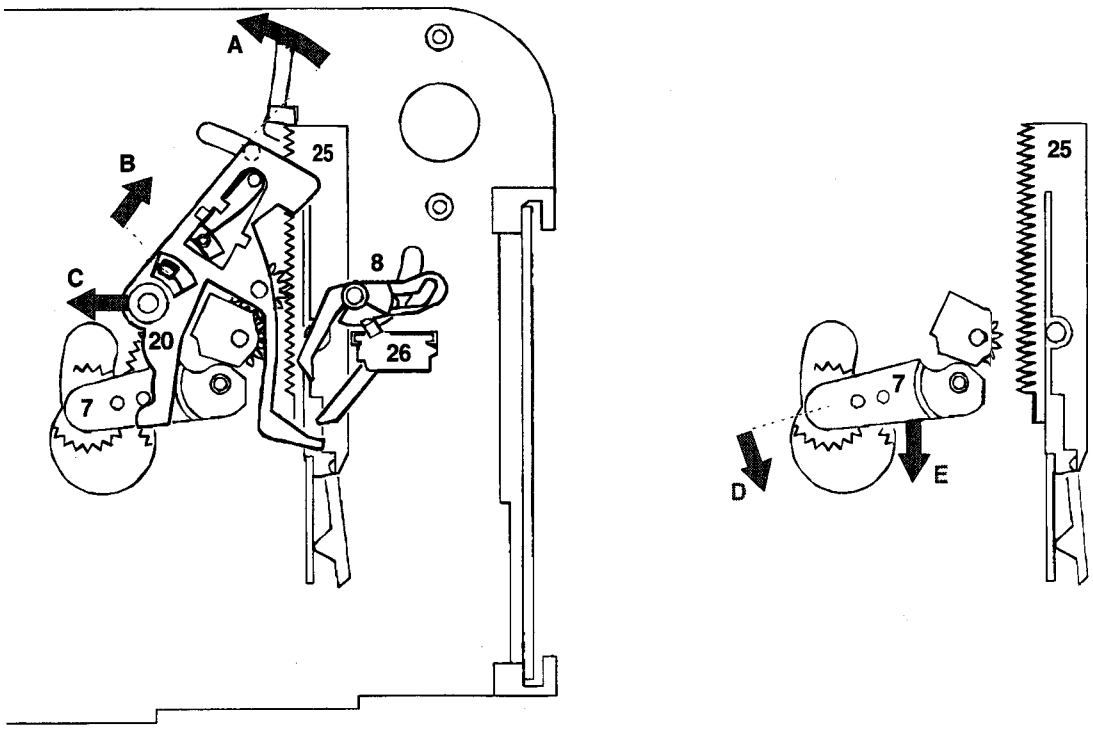


Fig. 7

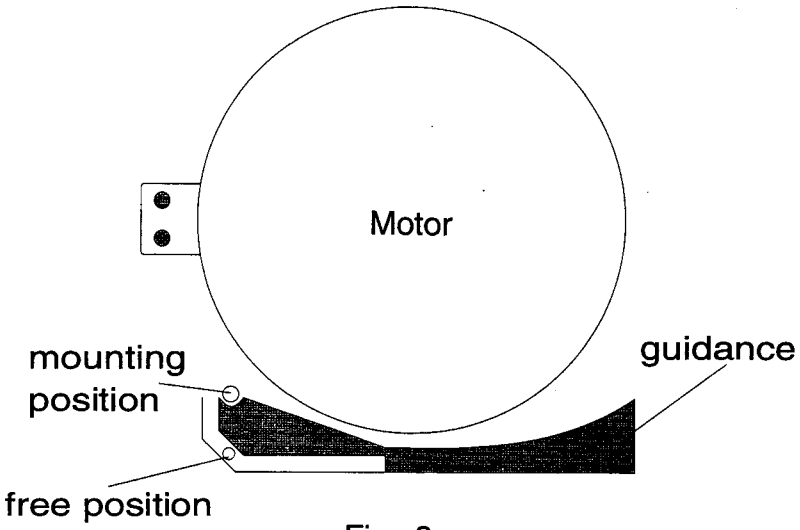
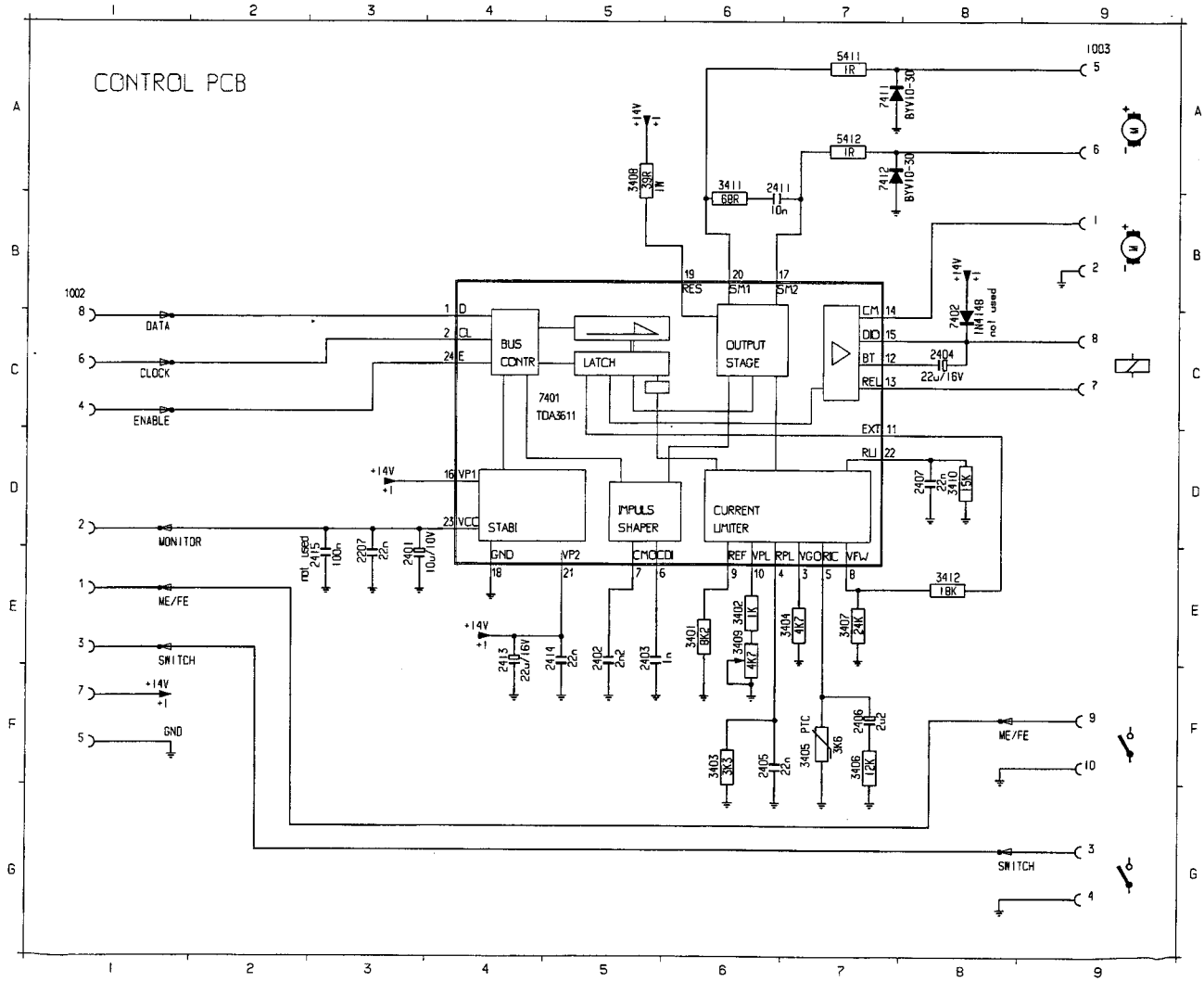


Fig. 8

1002 B 1	2402 E 5	2406 F 7	2414 E 5	3403 F 6	3407 E 7	3411 A 6	7401 C 4
1003 A 9	2403 E 5	2407 D 8	2415 E 3	3404 E 7	3408 A 5	3412 E 8	7402 C 8
2207 E 3	2404 C 8	2411 A 6	3401 E 6	3405 F 7	3409 E 6	5411 A 7	7411 A 7
2401 E 3	2405 F 6	2413 E 4	3402 E 6	3406 F 7	3410 D 8	5412 A 7	7412 A 7



MEASUREMENTS ON CONTROL PCB

ME/FE: 0,0 V (FE) / 5,0 V (ME/CR)
ON/OFF: 0,0 V (ON) / 5,0 V (OFF)

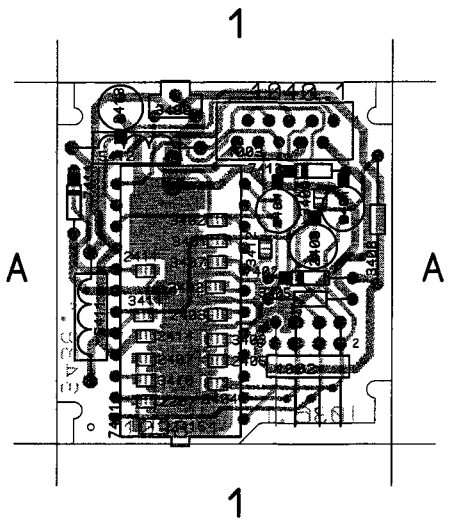
Pos. 7401 TDA 3611

1: 5,0 V
2: 5,0 V
3: 0,7 V / 0,0 V (Sb)
4: 0,8 V (PN) / 0,9 V (PR) / 0,3 V (W) / 0,0 V (Sb)
5: 0,8 V (PN) / 1,0 V (PR) / 0,4 V (W) / 0,0 V (Sb) / 0,1 V (TA)
6: 0,8 V (PN) / 1,0 V (PR) / 0,4 V (W) / 0,0 V (Sb) / 0,1 V (TA)
7: 0,7 V (P) / 1,8 V (W) / 0,0 V (Sb) / 0,6 V (TA)
8: 3,4 V / 0,0 V (Sb)
9: 1,2 V / 0,0 V (Sb)
10: 0,5 V / 0,0 V (Sb)
11: 3,4 V / 0,0 V (Sb)
12: 12,0 V
13: 0,5 V / 12,0 V (Sb)
14: 0,0 V / 11,5 V (P)
15: 11,5 V / 12,0 V (Sb)
16: 12,0 V
17: 0,1 V (PN) / 2,4 V (PR) / 0,0 V (WN) / 12,0 V (WR) / 0,0 V (Sb)
18: GND
19: 12,0 V / 8,5 V (P)
20: 2,4 V (PN) / 0,1 V (PR) / 12,0 V (WN) / 0,0 V (WR) / 0,0 V (Sb)
21: 12,0 V
22: 3,6 V (P) / 1,3 V (W) / 0,0 V (Sb)
23: 5,0 V
24: 5,0 V

All values measured DC - GND

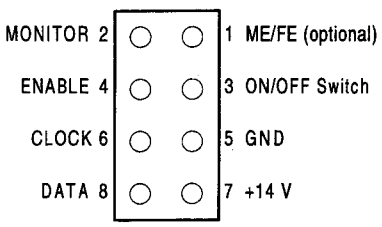
(P) = Play mode both directions
(W) = Wind mode both directions
(PN) = Play NOR direction
(PR) = Play REV direction
(WN) = Wind NOR direction
(WR) = Wind REV direction
(Sb) = Standby
(TA) = Traffic anouncement

1002 A 1 2413 A 1 3409 A 1
1003 A 1 2414 A 1 3410 A 1
2207 A 1 2415 A 1 3411 A 1
2401 A 1 3401 A 1 3412 A 1
2402 A 1 3402 A 1 5411 A 1
2403 A 1 3403 A 1 5412 A 1
2404 A 1 3404 A 1 7401 A 1
2405 A 1 3405 A 1 7402 A 1
2406 A 1 3406 A 1 7411 A 1
2407 A 1 3407 A 1 7412 A 1
2411 A 1 3408 A 1

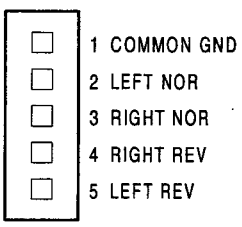


CONNECTORS

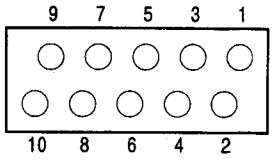
Control Connector
(View onto Radio-PCB)



Head Connector
(View onto Radio-PCB)

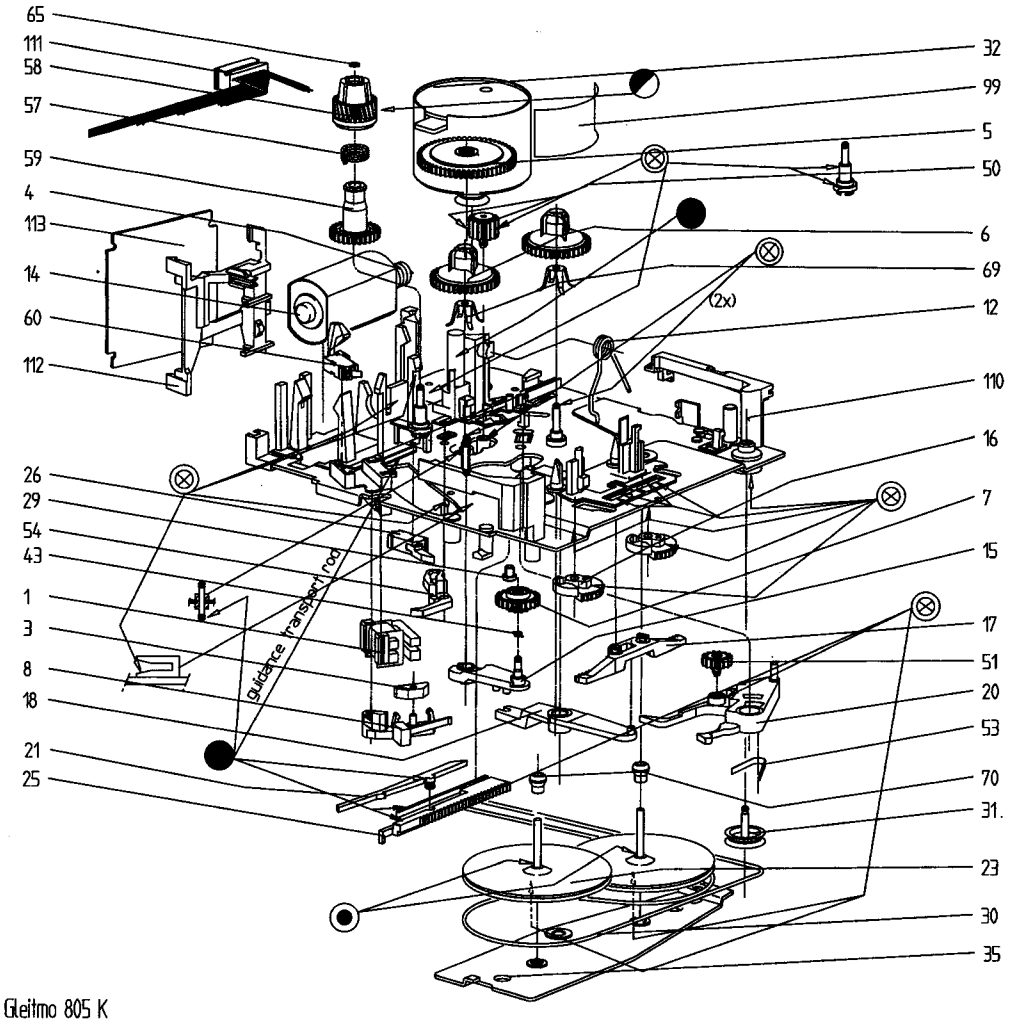


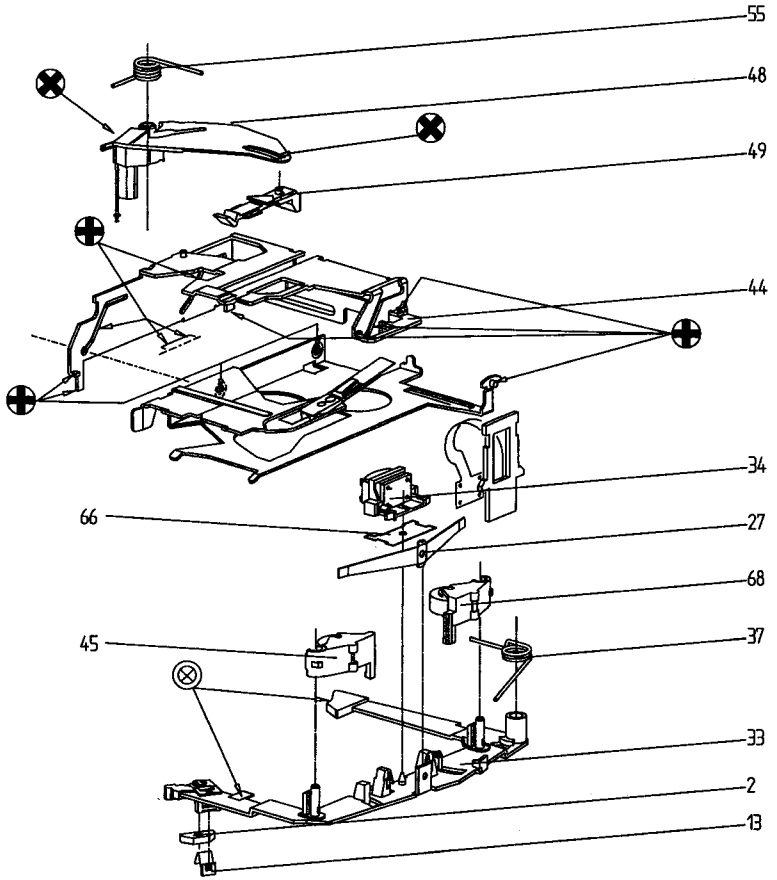
Deck Connector (Pos.1003)
(View onto Control-PCB)



1: Capstan +
2: Capstan -
3: ON/OFF Switch
4: GND
5: Servomotor +
6: Servomotor -
7: Magnet -
8: Magnet +
9: ME/FE Switch
10: GND

Front of Radio ↓





- Gleitmo 805 K
- Mobil SHC 634
- Contact Oel PDP 65
- Topas L30
- Gleitmo 585 K
- SM30 TF

MECHANICAL PARTS

1	4822 281 11051	DOUBLE
2	4822 404 21083	ANCHOR ON SUPPORT 33
3	4822 404 21084	ANCHOR IN HOLDER 8
5	4822 522 32868	WHEEL IDLER
6	4822 528 10776	CARRIER
7	4822 528 70658	ASSY
8	4822 404 21087	FOR ANCHOR 2
1	4822 492 70556	FOR ANCHOR 2
14	4822 361 30297	SERVO ASSY
16	4822 522 32869	NORMAL/REVERSE
17	4822 404 21089	DRIVING 16
20	4822 404 21086	ASSY SERVO GEARWHEEL
23	4822 528 81378	FLYWHEEL
26	4822 277 11215	ON/OFF
27	4822 492 70557	FOR PRES. ROLLER 45
29	4822 502 12548	FIX MOTOR 32
30	4822 358 31053	BELT, DRIVING
31	4822 528 81144	DIVERTING BELT
32	4822 361 30294	CAPSTAN
33	4822 404 21088	FOR HEAD,PRES.ROLLR
34	4822 249 30157	WITH FLEXPRINT
44	4822 466 82631	FOR CASSETTE
45	4822 528 81377	REVERSE
48	4822 404 21091	EJECT
49	4822 404 21092	HOLDING CASSETTE
50	4822 522 32871	COUPLING
59	4822 522 10435	ASSY
60	4822 277 11216	ME/CR
65	4822 532 52348	FOR CARRIER CLUTCH
68	4822 528 81449	NORMAL
69	4822 492 70926	UNDER CARRIER
70	4822 520 30539	FOR FLYWHEEL
111	4822 321 61954	CABLE, CONNECT
112	4822 256 92048	FOR PCB
113	4822 214 52077	PCB KOMPL.

ELECTRICAL PARTS

2207	5322 122 32654	22NF10%X7R 63V
2401	4822 124 22748	10UF 10V
2402	4822 122 33127	2,2NF10%X7R 63V
2403	4822 122 33178	1NF 20% X7R 50V
2404	4822 124 23279	22UF20% 16V
2405	5322 122 32654	22NF10%X7R 63V
2406	4822 124 41013	2,2UF 25V
2407	5322 122 32654	22NF10%X7R 63V
2411	4822 122 33177	10NF 20% X7R 50V
2413	4822 124 23279	22UF20% 16V
2414	5322 122 32654	22NF10%X7R 63V
3401	4822 051 20822	8K20 5% 0,1W
3402	4822 051 20102	1K00 5% 0,1W
3403	4822 051 20332	3K30 5% 0,1W
3404	4822 051 20472	4K70 5% 0,1W
3405	4822 116 40241	3K6 PTC
3406	4822 051 20123	12K00 5% 0,1W
3407	4822 051 20243	24K00 5% 0,1W
3408	4822 053 10399	39R00 5% 1W
3409	5322 101 11014	5K POTMETER
3410	4822 051 20153	15K00 5% 0,1W
3411	4822 051 20689	68R00 5% 0,1W
3412	4822 051 20183	18K00 5% 0,1W
5411	4822 050 21008	1R00 1% 0,6W
5412	4822 050 21008	1R00 1% 0,6W
7401	4822 209 32207	TDA3611
7411	4822 130 32911	BYV10-30
7412	4822 130 32911	BYV10-30

AIDS AND TOOLS

100	4822 390 10107	ISOFLEX PDP65
101	4822 390 20128	TOPAS L30
103	4822 390 10123	MOBIL OIL SHC 634
104	4822 390 20027	GLEITMO 805K
105	4822 390 20128	L30 TF
107	4822 390 20139	GLEITMO 585K